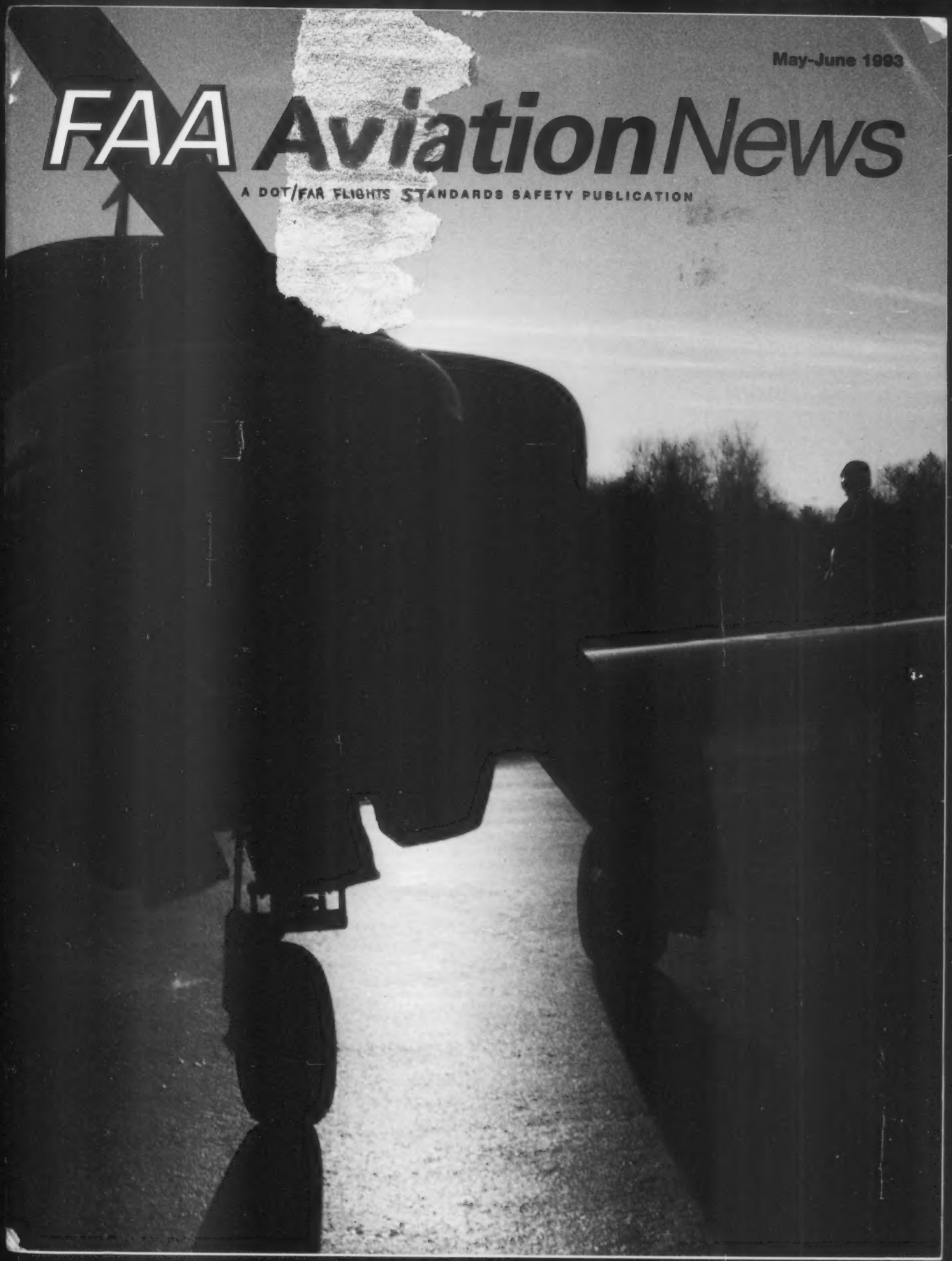
May-June 1993

FAA Aviation News

A DOT/FAA FLIGHT STANDARDS SAFETY PUBLICATION



U.S. Department
of Transportation

**Federal Aviation
Administration**

Federico F. Peña, *Secretary of Transportation*
Joseph M. Del Balzo, *Acting FAA Administrator*
Carl B. Schellenberg, *Acting Executive Director for System Operations*
Anthony J. Broderick, *Associate Administrator for Regulation and Certification*
Thomas C. Accardi, *Director, Flight Standards Service*
Robert A. Wright, *Acting Manager, General Aviation and Commercial Division*
Roger M. Baker, Jr., *Manager, Accident Prevention Program Branch*
Phyllis Anne Duncan, *Editor*
Louise C. Oerty, *Senior Associate Editor*
Dean Chamberlain, *Associate Editor*

The FAA's Flight Standards Service, General Aviation and Commercial Division, Accident Prevention Program Branch, AFS-810, Washington, DC 20591, (telephone 202 267-8017) publishes FAA AVIATION NEWS in the interest of flight safety. The magazine promotes safety in the air by calling the attention of airmen to current technical, regulatory, and procedural matters affecting the safe operation of aircraft. Although based on current FAA policy and rule interpretations, all printed material herein are advisory or informational in nature and should not be construed to have regulatory effect. The FAA does not officially endorse any goods, services, materials, or products of manufacturers that may be mentioned. **Certain details of accidents described herein have been altered to protect the privacy of those involved.**

The Office of Management and Budget has approved the use of funds for the printing of FAA AVIATION NEWS.

SUBSCRIPTION SERVICES

The Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402-9371, sells FAA AVIATION NEWS on subscription. Use the self-mailer form in the center of this magazine to subscribe. Cost: $8.00 ($10.00 foreign) for one year; $16.00 ($20.00 foreign) for two years. Prices are subject to change by the Government Printing Office without prior notice.

Change of Address or Subscription Problems: **Send your label with correspondence to Sup Doc, Attn: Chief, Mail List Branch, Mail Stop: SSOM, Washington, DC 20402-9373.**

To keep subscription prices down, the Government Printing Office mails subscribers only one renewal notice. You can tell how many copies are left in your subscription by checking the number that follows "ISSDUE" on the top line of your mailing label. For example, when this number is 003, it means you have three issues left in your subscription, and GPO will send you a renewal notice. The number 000 means you have received your last issue. To be sure that your service continues without interruption, please return your renewal notice promptly.

FAN SMITH 212J ISSDUE003 R 1
JOHN SMITH
212 MAIN ST
FORESTVILLE, MD 20747

May-June 1993

FAA Aviation News

Volume 32 Number 4

FEATURES

Editorial—Product Liability 1

Keeping PACE with Safety and Partnership 2

Staying Alert in the Cockpit 4

Last Leg Syndrome 9

Have You Got That Rhythm? 11

Pilot Decision Making, Part 1 12

Crew Coordination Problems 15

Corporate Flying 18

DEPARTMENTS

FamousFLYER: Augustus Herring 23

FlightFORUM 25
Airspace Corner . . . . . *Inside Back Cover*
Instrument Corner 25

AvNEWS/BRIEFS 27

On the Covers:
The decision to go or not to go is not always dependent on the weather. Sometimes pilots can be more dangerous to themselves than any thunderstorms. See the series of articles on page 4 through 14.

Cover photo by G. S. Livack

Product Liability: A Case Study

by John S. Yodice

Product liability is a continuing problem to general aviation—in terms of the overall problem and the conflicting interests that we have as aircraft owners and pilots. On the one hand, we want a fair compensation system for persons who may be injured or damaged by aviation products—usually aircraft owners and pilots and their families and friends. On the other hand, we would like to have the continued availability of aircraft and parts at reasonable cost, and product liability is driving the manufacturers out of business and driving up the costs of products.

A product liability case now working its way through the court system is gaining a lot of attention. There has already been one jury trial, a number of appeals, and there is the prospect of a second jury trial. The facts of the case and some of the law and procedure are interesting and potentially precedent-setting.

The accident happened in 1983 at a residential airpark in New Mexico. The pilot was attempting a takeoff in a Piper *Super Cub,* towing a sailplane. In the takeoff, the *Cub* struck a van intentionally parked on the runway by the airpark owner to prevent the takeoff. Apparently, there was some feud going on between the airpark owner and the sailplane operators because of alleged safety violations.

The reason for the flight was to photograph the sailplane for a television commercial. The pilot had the front seat (which had a shoulder harness) removed and had installed in its place a large movie camera on a camera mount. The camera was mounted in such a way that the cameraman had to sit on two-by-fours facing rearward toward the camera and with his back against the instrument panel. The pilot sat in the rear seat, which had no shoulder harness.

AOPA

John S. Yodice

When the *Cub* struck the van, the pilot's body jackknifed forward, and his head hit the camera mount, causing massive head injuries and brain damage. The camera operator was not seriously injured.

The pilot and his wife first sued the van driver for the pilot's injuries, and that case was settled for $600,000. The pilot and his wife then brought a product liability lawsuit against Piper Aircraft Corporation. They alleged that Piper was negligent in the design of the *Super Cub* for two reasons: One, that the *Super Cub* had inadequate rear-seat forward visibility during takeoff, which caused the collision, and two, that the injuries were caused by the lack of a rear-seat shoulder harness.

At a trial in 1986, a jury brought in a verdict in the amount of $2.5 million. At the request of the injured pilot's lawyer, the jury was asked to make two separate allocations of fault: first among the persons responsible for the collision (called the "original tortfeasors") and second among the persons responsible for the lack of a shoulder harness (called the "crashworthiness tortfeasors"). The jury decided that the collision was 42.5% because of the injured pilot, 41.7% because of Piper, and 15.8% because of the person who had approved the alterations to the cabin of the *Super Cub* to install the camera (that person was also the sailplane pilot). The shoulder harness fault allocation was 8.4% to the injured pilot and 91.6% to Piper. The jury decided that the van driver had no fault for the pilot's injuries. The injured pilot's lawyer argued that judgement against Piper should be entered for 91.6% of the $2.5-million verdict. But the trial court granted judgement against Piper for only 41.7%.

Continued on page 14

Keeping PACE with Safety and Partnership

by Dean Chamberlain, *Associate Editor*

There is a new acronym in the FAA's aviation safety vocabulary: PACE (Pilot and Aircraft Courtesy Evaluation) is the FAA Accident Prevention Program's newest national safety outreach. Instituted formally by the FAA in March 1993, the voluntary PACE program has been under development since 1990. Known in some test areas as "ACE" (Aviation Courtesy Evaluation) and "Operation Fixed Wing" in others, PACE offers pilots and aircraft owners an opportunity to request a non-adversarial FAA review of their piloting techniques and aircraft's airworthiness without risk of FAA penalty. The program's concept is simple. FAA aviation safety inspectors will check pilots and their aircraft for compliance with the appropriate Practical Test Standards and Federal Aviation Regulations (FAR) without risk of penalty. Any inadvertent discrepancies found by the inspectors will be noted, and the pilot or aircraft owner will then be responsible for correcting them. The program's goal is as simple as its concept; to increase aviation safety through the voluntary efforts of airmen and FAA by detecting and correcting any inadvertent non-compliance.

If you are wondering why PACE and why now, the answer is again very simple. PACE is another example of the FAA's ongoing efforts to increase aviation safety through voluntary compliance. This increased voluntary compliance is based on developing more trust between and a greater working partnership with the FAA and the aviation community. PACE is one span to help bridge the gap between FAA's aviation customers and the FAA and to help improve the flow of critical safety information between airmen and FAA. The need to maintain the critical flow of information between airmen and the FAA is why FAA inspectors do not pursue legal enforcement action for inadvertent acts of non-compliance with the FAR or PTS discovered during PACE. PACE's "no penalty" policy gives pilots and aircraft owners the opportunity to have the FAA review their compliance with the FAR and PTS without risk, and it gives them the freedom to ask questions and discuss their problems with the FAA without fear. This "no penalty" aspect also means no one fails an evaluation under the PACE program. Now, if you are wondering what happens if a pilot or aircraft "does not pass" a PACE check, which is not the same as failing, the answer is best illustrated by the following example.

Typically, a pilot and aircraft courtesy evaluation starts with an aviation group such as an FBO or group of pilots coordinating with their local FSDO's FAA Accident Prevention Program Manager to hold an evaluation at a mutually agreeable time and airport. PACE could be part of an aviation safety day, a fly-in or other type of group activity. The idea is to have as many pilots and aircraft as possible participate during the available time. During the planning stage, planners should give some thought about bad weather because PACE is a VFR event. Once a PACE event is scheduled, pilots and aircraft owners need to do some homework before they show up. Pilots will need their pilot's certificate, current medical, and a record or logbook showing currency and appropriate endorsements. This also includes a record of a flight review or equivalent. An FCC radio operator's permit is required if the pilot flies internationally or operates certain types of radio equipment. The pilot/aircraft owner must also have the appropriate aircraft documents such as the aircraft's registration, airworthiness certificate, weight and balance data, FCC radio station license, and appropriate operating limitation/s, such as an aircraft flight manual, or pilot operating handbook, and appropriate maintenance record entries showing compliance with airworthiness directives (AD) and required inspections and equipment installations. Once the appropriate certificates and records are assembled, pilots should also review the appropriate FAA Practical Test Standard (PTS) for their pilot certificate. If all of the above is accomplished, the pilot/aircraft owner should be ready for PACE. A good PACE checklist might be the pilot test checklist in each PTS book. As a final

reminder, current charts will be needed for the flight.

An actual PACE starts with an Airworthiness Safety Inspector checking the designated aircraft's airworthiness. This check should take about 45 minutes. The evaluation of aircraft documents, markings, placards, manuals, equipment, cargo, and general airworthiness will be done using only simple inspection techniques. Since no flight evaluation can be done if the designated aircraft is not airworthy, you might be wondering what happens if the inspector discovers something that makes the aircraft unairworthy. The answer depends upon how serious the problem is. A minor problem might be corrected and signed off by the local FBO's maintenance shop at the airport, and if time permits, the flight portion could then be flown. Another option might be for the inspector to issue a ferry permit so the pilot could fly the aircraft home for repairs. If the aircraft is found unsafe for flight, the aircraft would be grounded until repairs could be made. Regardless of the problem, if any example of inadvertent non-compliance with the FAR is discovered during a PACE inspection, no FAR enforcement action will be taken. But it must be emphasized that the aircraft's owner/operator has the responsibility to ensure the aircraft is in compliance with the FAR before further operation. PACE does not protect pilots or aircraft owner/operators from further operations in non-compliance with the FAR. This means that participation in the PACE program does not provide future immunity for the pilot or aircraft owner/operator from subsequent discovery of non-compliance with the FAR such as during a ramp check on the way home or involvement in an incident or accident. One comment regarding additional airworthiness: Pilots/ aircraft owners/operators should be aware that continued operation of an aircraft that is in non-compliance with the FAR not only subjects you to possible enforcement action, it might also void your insurance coverage in the event of an accident or incident. Many insurance policies require the aircraft to be airworthy and the pilot to meet appropriate FAR as a condition of coverage. If it can be proven that an aircraft was not airworthy at the time of an accident or incident, or the pilot was not in compliance with the FAR, the aircraft/ pilot may not be covered by insurance. The only way to be sure is for every pilot/owner/operator to understand the limitations of his or her insurance policy before the policy is needed.

Assuming the aircraft is found airworthy, the operations aviation safety inspector will then brief the pilot on the proposed evaluation flight. The flight will probably consist of a takeoff and area departure, some basic airwork, then a return to the airport followed by one or more landings. During the estimated 45 minute flight, the maneuvers flown and standards used will be those in the Practical Test Standards appropriate to the pilot's certificate. Following the flight, the inspector will debrief the pilot on any areas that might need additional work. If the PACE flight reveals that additional work or training is needed, it is up to the pilot to seek additional training with a CFI of his or her choice. Two important points need to be made regarding a PACE flight, since the flight evaluation is only a courtesy evaluation, the flight cannot be an instructional flight. The FAA inspector is not expected to give dual instruction during the flight. Therefore, the flight can not serve as either a Flight Review or as the dual instruction required for the Pilot Proficiency Award Program (WINGS) program. And like other flights with FAA inspectors, the pilot being evaluated is the pilot in command during the flight and therefore responsible for compliance with all FAR during the flight. The FAA inspector is only an observer during the flight. The inspector is not an instructor or required crewmember during the flight.

Since PACE is a voluntary no-penalty program promoting safety, no records of the airman or aircraft evaluation are kept for follow-up action by the FAA other than the records normally required to be kept such as file copies of the ferry permit if one is issued. Rather than documenting and following up on discovered discrepancies, FAA is depending upon the airmen participating in the program to correct any discrepancies discovered during PACE.

To recognize the dedication and efforts of the pilots and aircraft owners/operators participating in the PACE program in supporting aviation safety, local FSDO's are authorized to issue certificates to all of those who participate in the program.

To learn more about the PACE program and how you can help promote aviation safety in your area, contact your local FSDO's Accident Prevention Program Manager (APPM). A national list of APPM's with their telephone numbers and addresses was published in the November-December 1992 issue of *FAA Aviation News*.

Set the PACE for Safety in your area, call your local APPM today. ■

Piper Aircraft Corp.

Staying Alert in the Cockpit

by Douglas S. Ritter

fatigue

Sleep deprivation and its effect on pilot performance

Sometimes the subject for an article just reaches out and shakes you awake to the need to address it. Such was the case a few months back as we flew home late one night after a couple of long days away on business. I was looking forward to getting home and getting to bed. All of a sudden, I was jerked from my thoughts as Center called out traffic. I realized that I had not been paying attention to what I was doing. No danger, but the adrenalin rush served to focus my attention for the remaining 15 minutes of the flight. The long days had obviously taken their toll on my alertness. It turns out that the most common cause of diminished alertness is associated in some manner or other with loss of sleep or interruption of normal sleep patterns. I had not gotten much sleep, and it was well past my normal bedtime.

Most pilots have found themselves in similar situations or worse. Some have succumbed to sleep and flown far beyond their intended destinations before awakening. No doubt, some have fared worse. Studies have shown that accident rates climb precipitously during certain hours as our bodies try to get the sleep they need.

How far can we push ourselves before we pay the price? What can we do to prevent or postpone the inevitable?

Though many of us are loath to admit it, pilots are not superhuman. We are susceptible to the same frailties of the human condition as are all others. Sleep is one of these areas where pilots often fail to acknowledge limits.

Adequate sleep is absolutely vital to maintain alertness and a sound state of mind. Research during the past decade or so has done a lot to illuminate the previously murky condition we refer to as sleep, as well as define its vital role in our health. Simply put, you must have sleep or your mind will fail. Within limits, you can postpone or reduce the sleep you need. Once beyond those limits, performance rapidly deteriorates. Push too far and you lose your rationality and maybe even your life.

We have all grown up with the recommendation that we need eight hours of sleep each day. Like so many other truisms, this one is not exactly true. The average healthy adult may need about eight hours of sleep, but most people need more when they are growing up and less as they age. By late middle age, we are down to an average requirement of seven hours. Many people need less, and many need more. Some get by with as little as four hours' sleep, and others may require nine or 10. What we need is driven by our own internal biological clock, and there is relatively little we can do to alter that program.

25-Hour Clock

Researchers say the average American in today's whirlwind-paced world gets an hour to one and a half hours too little sleep each night. How can you tell if you are getting enough sleep? Well, if you are awakened by your alarm, have trouble getting going, or just do not seem to function well in the morning, then it is a good bet you did not get enough sleep. Try sleeping a half hour longer for a while and see if you do better in the morning. If not, add yet another half hour. At some point, you will find a remarkable difference in how you feel. That is the amount your body is "programmed" to sleep. Any less, and you pay for it.

Sleep serves as a restorative to both the body and mind. No matter how physically strenuous the day has been, a good night's sleep will allow the muscles to recuperate. This is a relatively simple process. The manner in which our brain reacts to sleep is very much more complicated.

To understand how sleep loss affects our performance, we must first have at least a basic understanding of sleep. Our bodies have a natural biological clock referred to as the circadian rhythm. This internal clock has a period of 25 hours. No one is quite

sure why it lasts a full hour longer than a normal day, though many theories exist. There is surprisingly little variation among individuals in the total length of this rhythm.

This 25-hour clock drives our waking and sleeping periods. When we try to operate counter to it, we pay a price. The extra hour is also the reason that it is usually easier to stay up late than to get up early and explains why most of us have more trouble with jet lag when flying from west to east.

Each day when we get up in the morning, we reset our biological clocks. If we did not, every day we would get up one hour later than the day before. It is daylight that does it. Studies of subjects living in isolation, away from any other influences, show they quickly adapt to a 25-hour day, getting up an hour later and going to bed an hour earlier each day.

Our body is influenced by this internal clock in other ways. Our temperatures fluctuate in a cycle that normally has its high during the day and its low late in the night. When our body temperature is low, our brain is inclined toward sleep. "Night people," who are active late into the night and then sleep late during the day, have simply retarded their internal clocks.

Energy Cycle

Within this internal 25-hour cycle exists another cycle of approximately 90 minutes' duration, known as the ultradian rhythm. Our energy level and capacity to perform rises and falls in 90-minute internals as we go through the day. If you make the effort, it is usually easy to recognize these peaks and valleys in your capacity for work and alertness. You are more susceptible to daydreaming or drowsiness during the lowest part of your energy cycle.

Another, somewhat analogous cycle is evident during sleep. Sleep is divided into five stages. The first four stages are known as non-REM sleep and normally occur in ascending and descending cycles (1–2–3–4–3–2–1) lasting a total of 90 minutes on the average. The first cycle can often run up to 110 minutes. The first stage is a bridge between being awake and asleep. We might just as easily wake up as go to sleep. Stage 2 sleep is true sleep that takes up about 50% of each night's sleep. Stage 3 sleep is deeper than Stage 2 and lasts only a short while, acting somewhat as a transition between Stage 2 and Stage 4 sleep, which is the deepest sleep.

During this stage, you are virtually "dead to the world." It is very difficult to wake someone who is in Stage 4 sleep, and, if awakened, he or she will tend to be nearly incoherent for 10 to 15 minutes. If allowed to resume sleeping before fully awake, there will be no memory of awakening. This stage amounts to about 13% of a young adult's sleep, but it is reduced to nearly zero by late middle age. Many scientists lump Stage 3 and Stage 4 sleep together and call it "slow wave" sleep because the brain's waves are moving at their slowest.

The fifth stage of sleep is REM sleep. REM is an acronym for rapid eye movement. This is the lightest state of sleep and is the stage in which we dream. The first period REM sleep normally occurs at the end of the first sleep cycle, about 60-80 minutes into the cycle, after the second period of Stage 1 sleep. It will last from five to 15 minutes.

Systems Shutdown

As the night progresses, this sequence of stages repeats four or five times. In each subsequent cycle, the portion of REM sleep increases and that of non-REM decreases, especially Stages 3 and 4 sleep. During the last one or two cycles, REM sleep may totally supplant Stage 3 and 4 sleep. REM sleep normally comprises about 25% of the total in adults. Many researchers believe that REM sleep plays an important part in brain development and daily rejuvenation. It is evident in the womb, and babies spend at least half their sleep time in REM sleep, premature babies up to 75%. During REM sleep, the brain is very active, but the body's motor and sensory systems are shut down. REM, or dream, sleep is absolutely vital to maintain your sanity. It is so important that if you are deprived of it, your brain may try to compensate by daydreaming or increasing the length of any REM sleep it does get. There is another time period when our internal clock seems to encourage us to sleep. Adults have a dip in alertness and a tendency to sleep during the middle of the afternoon. When we are active, we may not notice it so much. When we are less active, or in a susceptible state because of some sort of sleep deficiency, it may be much more evident. The afternoon siesta is a cultural feature in many warmer climates. Its impetus resides within ourselves, and we carry it when it has been socially exorcised.

Sleep Deficit

From a practical standpoint, when we mess with our internal schedule or try to act in contradiction to it, we are asking for trouble. Studies have shown that accident rates rise in mid-afternoon and then rise again significantly at night.

When sleep is postponed, your brain incurs what is known as a sleep debt. Like money owned, it must eventually be repaid. Like interest, it is cumulative. The good news is that you get a pretty good deal. You do not pay it back hour for hour. If your accumulate 10 hours of sleep debt, it may take you only a few nights of good sleep to recover. The more debt you incur, the longer the recovery takes. In extreme instances, it can take weeks to recover fully. This is why it is best to try and deal with it preventively or use naps and other methods to compensate for the sleep loss as quickly as possible. Even a couple of hours of sleep loss can affect your performance to some degree. But we are generally able to cope satisfactorily if that is all that is involved and there is sufficient motivation to perform well. The more sleep you lose, the more sleep debt you accumulate, and the more difficult it becomes to perform acceptably, no matter how strongly you are motivated.

Piper Aircraft Corp.

Jet Lag

Recent studies indicate that the biggest drop in alertness is associated with significant disruptions to circadian rhythm as opposed to simple sleep loss. Jet lag is the best known of these disruptions. It can take many days for you to readjust your internal clock; in the meantime, your performance will suffer. There have been all sorts of strategies suggested for those who want to cope better with jet lag—diets, exercises, special schedules, etc. Researchers say no single method is right for everyone. Generally, the best results come from efforts to adjust your internal clocks before leaving. For very short trips, some find it easier to stay in sync with home time and not even attempt to change. Either way, you are likely to be much better off than if you do nothing.

There have been a lot of media attention to recent reports that very bright lights can be used to adjust your internal clock rapidly. This would be a boon to those who work shifts or travel extensively. Some companies are even offering "jet lag lights" for sale. The problem is that the exciting results have been achieved primarily in the lab or under very controlled conditions, such as with the shuttle astronauts. It is not simply a case of buying a very bright light and turning it on for a while. So, while light accommodation shows great promise, it has not yet been proven effective in the real world.

Repaying the Debt

Recovery of sleep loss will take place at its own sweet pace. You cannot force it. The best strategy for most people is to go to bed early rather than trying to sleep later in the morning. If you are trying to overcome significant sleep debt by sleeping longer than normal, at some point, say an extra hour or two, you will wake up. If you do not fall back asleep within 30 minutes, it is best to get up and do whatever it is you have to do. But listen to your body. When it tells you it is ready for some more sleep, do not fight it. Find a place to lie down and sleep. This is the quickest way to recover.

Asleep at the Controls

A common problem for pilots flying today's modern aircraft is that there is often little to do. With sophisticated autopilots and navigation equipment, the pilot is left only to monitor the progress of the flight. This is particularly a problem when flying IFR in solid but benign IMC, because there is not even the need to scan for traffic. With little to do, there is a natural tendency to fixate on an instrument or object and drift off. This tendency becomes more pronounced when you have some sort of sleep deficit.

There is a number of dangers here. One is that you will actually fall asleep and completely lose track of what is going on. Hence the flights that have continued far past their intended destinations. Another danger is that, while you may not fall deeply asleep, you may cease to monitor the instruments adequately and may not catch some deviation from the norm, such as an increasing oil temperature or slipping off your assigned altitude. If something goes drastically wrong, most pilots would be unable to respond immediately. And when they do respond, there is a significant likelihood that the response may not be the best for the situation.

Finally, there is a danger which develops during a normal flight as you transition from the monitoring phase to the active phase; for example, when landing. If you have even somewhat succumbed to the tediousness of the monitoring phase, your performance may suffer as your brain struggles to "spool up" from the monitoring to the action modes.

Strategies for Warding Off Fatigue

Naps between flights can be an effective tool with which to combat sleep deprivation. Unfortunately, for most of us, the idea of taking a nap is accompanied by social stigma left over from the Puritan work ethic. But numerous studies have confirmed the positive influence a short nap can have on productivity. This usually more than compensates for time lost to the nap. At any rate, *a good nap before flying is your best defense against the perils of falling asleep or of diminished alertness in the cockpit.* It is also an important aid in recovering from a sleep deficit.

According to Dr. Mark Rosekind, principal investigator in the Fatigue Countermeasures Program at the NASA-Ames Research Center, a good nap can take two forms. What you want to *avoid,* if possible, is a nap that is interrupted in a deep sleep phase.

Anyone who has been awakened from deep sleep will recall how groggy they felt and how long it took to become effective again. So, the nap should either be quite short (40 minutes or less) or long enough (90–110 minutes) to enable a full cycle of sleep, including Rapid Eye Movement (REM) sleep, to occur. It is in Stage 1 sleep that you are best prepared to awaken with a minimum of problems.

Even when awakened from a light sleep, we carry forward what is called "sleep inertia." You know the feeling. You are groggy, not quite wide awake, not quite ready to deal with anything too complicated. So, after a nap, always wait at least 15 minutes before jumping in the car or plane.

Most of us have read about the recent NASA study that recommended naps for crew members on long-haul flights. A 40-minute "NASA nap," or "power nap" as they have come to be called, taken within a few hours of landing, has proved to be extremely effective. Many long-haul crews already have instituted power naps as a matter of course, and the FAA is preparing an advisory circular covering the matter. Obviously, a nap is a bit impractical for the single pilot, though there are plenty of stories about pilot who intentionally or inadvertently let the autopilot do the flying while they took a catnap. That certainly is not something we can recommend. If fact, you may be better off leaving "George" sleeping to help prevent you from dozing off. Hand flying should keep you more alert.

Seeking Stimulation

Physical or mental activity coupled with outside stimulation is one of the best methods for keeping sleep at bay. An active conversation with your copilot or passenger can be very stimulating during cruise flight when it is not necessary to devote full concentration to flying the aircraft. Simply engaging in mental activity—mind games and the like—will not do it. This withdraws you from the flight environment—exactly what you do not want.

Caffeine is the safest stimulant you can use to stave off sleep. For best results, Dr. Rosekind suggests using it more strategically than many of us tend to. Do not just start drinking coffee, tea, or cola first thing and then continue throughout the flight. All that caffeine is not healthy, but, more relevant to our concerns here, there is a very real danger that you will reach a point where it ceases to be effective at all. When you reach this point, virtually nothing is going to be able to keep you awake. A better bet is to use caffeine judiciously, i.e., only when you need it. If you find yourself getting drowsy, drink something at that time. If you want a little extra perk-up during the approach, take some a half hour before.

It is important to stay hydrated while flying. Dehydration can contribute to tiredness. Caffeine is a diuretic. Besides dealing with the possibility of the need to relieve yourself, you must also be careful not to become dehydrated.

Some pilots swear by oxygen to wake them up, and, indeed, most authorities recommends that supplemental oxygen be used above 10,000 feet during the day and above 5,000 feet at night. If you are drowsy, even mild hypoxia that would not normally cause a problem could be more dangerous. At night, oxygen is a good idea anyway, since our night eyesight can be significantly improved by its use.

Alertness Monitors

Some pilots have reported good results from "doze alarms," which are designed for drivers and offered in catalogs and sometimes on TV. These alarms fit over the ear and are set off by a mercury switch when your head tilts, as it is likely to do when you doze off. Pilots who have tried these alarms say they can be used only during cruise and in smooth air. They do take some getting used to so that you do not set them off while scanning for traffic. Scientists are examining a number of more sophisticated devices that would perform a similar function. These "alertness monitors" would react to our brain waves or some other empirical measurement, but it will be at least a few years before alertness monitors are commercially available.

The cockpit environment can make a difference. It should come as no surprise that a warm cockpit is conducive to drowsiness. Better a bit too cold than too hot. If possible, direct a flow of colder air at your face.

Certainly, there is a lot to be said for moving around as much as possible.

Piper Aircraft Corp.

For the single pilot, this may be limited to adjusting the seat to different positions or engaging in some isometric exercises. For others, it is a good idea to get out of the seat for a while and move around. But do not stay away too long. The other pilot could nod off while you are away. (That is the reason the NASA nap is only recommended when there are at least three flight crew members aboard, so there are always two at the controls.)

Getting to Sleep

For many pilots, getting to sleep, particularly when away from home, is very difficult. Whether recovering from a sleep deficit or trying to prevent it, there are things you can do to help you get to sleep. As with so many other things, a healthy diet and moderate exercise tend to contribute to better sleep. There is little or no scientific evidence that various vitamin supplements or other commercially offered diet supplements promote good sleep.

Contrary to some people's expectations, exercise right before climbing into bed is not helpful. In fact, it is extremely counterproductive, no matter how exhausted you are when you finish. This is because the ideal and necessary precondition for falling asleep is relaxation. After exercise, your body may be tired, but it is not relaxed, and neither is your mind. So, get your exercise earlier in the day.

Relaxation can be accomplished in a number of ways. Some people read; others watch TV. Some pilots have found it advantageous to practice relaxation therapies they have learned.

It is best to avoid eating right before going to sleep. This is not to prevent bad dreams but to prevent the relatively mild action of the digestive process from interfering with relaxation. Liquids are easier to digest and are less of a problem. Many people swear by the soporific effects of a warm glass of milk or chamomile tea. There are actually sound biochemical reasons why these may work.

Researchers discuss the importance of ritual for getting to sleep. Ritual in this sense is nothing more than an habitual activity associated with going to bed and to sleep. Most of us follow certain rituals without being aware of them. They may include brushing teeth, reading, saying prayers. Others may involve the manner in which you undress, what you do with your clothes, and the way you arrange your bed or pillows. The smallest things may play an important role in preparing for sleep. Whenever you interrupt these rituals, you may find it more difficult to get to sleep. This is magnified away from home. If you have or develop rituals which are easily transported, it can make it easier to fall asleep. Some travelers find it helpful to always bring their own pillow along.

Dark and Quiet

For most people, the darker the room, the easier it is to sleep. This is especially important for a pilot trying to sleep during the day. At home, prepare your sleeping quarters ahead of time to be as dark as possible. Some pilots carry a roll of duct tape or Velcro with adhesive backing to enable them to affix curtains and blinds to block as much light as possible in their hotel rooms. Some FBO's have "sleep rooms" for flight crews. Some hotels that cater to airline pilots also have special rooms prepared. It pays to ask around.

Quiet is also very important. While some of us can sleep under any circumstances, most of us are kept awake by loud noise or unfamiliar sounds. Ear plugs can be very helpful. Some people find them discomforting at first, but most get accustomed to them quickly. Another tactic is to use "white noise" to mask sounds. There are a number of commercial products available that are specifically designed to generate a calming background noise. In a pinch, turn on the fan in the room heater or air conditioner or set the radio between stations so all you hear is a static "hiss." Either one of these can do the trick.

Use of Alcohol

Alcohol can be extremely detrimental to good sleep. Though it is a sedative, its side effects tend to make it a poor choice for promoting sleep. Further, alcohol-induced sleep tends to be of very low quality with considerably reduced REM sleep. There is also a tendency for insomnia to develop later in the sleep cycle, as sleep often becomes fitful. Alcohol also suppresses normal shifts in posture than accompany transitions between the stages of sleep. This can result in compression of the radial nerve in the upper arm and, ultimately, in so-called "Saturday night paralysis."

Countermeasures

The researchers at NASA-Ames plan to issue an "educational and training module" entitled "Flight Crew Fatigue Countermeasures" some time this summer. It will contain their recommendations for counteracting the effects of sleep deficiency. The free guide will be available from the Fatigue Countermeasures Program, NASA-Ames Research Center, MS 262–4, Moffett Field, CA 94035. For anyone interested in learning more about sleep, an excellent source is *Sleep* by J. Allan Hobson, published in 1989 by Scientific American Library.

Sleep deficiency is a way of life for many pilots. Hopefully, the suggestions here will help you avoid the extreme penalty paid for succumbing to the effects of sleep deprivation. The important point is that each of us is different, and what works for one may not for another. So, try various strategies until you find those that work for you. You cannot make the problem go away, no matter how badly you want to. The best you can hope for is that your chosen strategies will allow you to postpone sleep until your flight is safely completed. ■

This article has been reprinted courtesy of Aviation Safety *magazine. For further subscription information, contact* Aviation Safety, *Subscription Services, P. O. Box 420234, Palm Coast, FL 32142; (800) 829–9162. The cost is $84 a year for 24 issues; $6 for single copies.*

Piper Aircraft Corp.

Last Leg Syndrome

by Bill Monan, *ASRS Analyst*

This is the fifth and final article in a series reprinted from ASRS Directline, *a quarterly publication that addresses particular areas of safety that appear in pilot reports received by NASA's Aviation Safety Reporting System and which have been identified by safety analysts as "significant."* ASRS Directline *is free from ASRS, NASA-Ames Research Center, Moffett Field, CA 94035. The last leg of a long flight is where fatigue, stress, and "get-home-itis" all seem to combine to make a pilot's life miserable. Knowing the problem is the beginning of making sure that the last leg of a flight is not the ultimate leg.* ***—Editor***

One of the routine details frequently noted in pilot incident reports submitted to ASRS is the seemingly innocuous statement, "This was the last leg of the flight." Terminology in other reports varies only slightly: "The last flight of the day," "the final leg," and "the end of a long day."

These air carrier, commuter, and corporate/general aviation pilots were involved in altitude "busts," heading/course deviations, missed crossing restrictions, active runway transgressions, and other, less typical operational incidents.

What is there about the "last leg" that is fundamentally different from any other leg? Let's take a look at some of the factors involved in last-leg operations.

Fatigue

Reporters identified fatigue as an obvious source of error. ASRS narratives included statements such as, "fighting bad weather all day," "multi-approaches to ILS minimums," and "delays" which merged with "end of a long thirteen hour duty day," "the ninth and last leg of a long day." Such descriptions often prefaced complaints such as, "a little tired" and "somewhat fatigued" to "worked out," and "punchy," not to mention "mentally and physically exhausted." "After all," contended one pilot, "some inattention is to be expected at the end of a long duty day."

A good case can be made that fatigue contributed to subsequent breakdowns in discipline and procedures and to attention problems.

Attention Problems

Loss of concentration was referenced in flight crews' explanations of last-leg error such as crossfeeds left on, pressurization switches left off, and misreading of systems gauges and switches. Two flights departed without adequate fuel on board. "I glanced at the fuel gauges," stated one first officer, "but what I was looking at did not register." The second and compounding error came about "when both the captain and second officer looked at the three fuel gauges, each reading 5,000 pounds, and came up with a total of 30,000."

Forgetfulness plagued the pilots. A number of flight crews "forgot" to call the tower for landing clearances. "Just too many landings for the day," explained one reporter. Flight crew neglected to reduce to 250 knots below 10,000 feet, to make crossing restrictions, to tell the other pilot of the ATC re-clearance, and, on two occasions, "forgot to let down."

> "Last leg of the flight. Driving along at flight level 370, inbound to home, so I'm letting my guard down a bit. The controller gives us a clearance to descend, to cross 35 miles of XYZ at 19,000. . . . A little later, another clearance, this time to cross 5 miles W[est] at 13,000. The controller added, 'See if you can make this one.' What happened? We had stayed at our cruise altitude. The captain didn't catch it, and I missed it because I was so darned tired I was letting him run the store."

Another flight crew failed to read the checklist:

> "We advanced the throttles to takeoff power. Upon hearing the [takeoff] configuration warning horn, I glanced down to verify the warning and was totally surprised to see the flaps in the UP position. I could hardly believe we had forgotten to read the taxi checklist and to extend the flaps!"

Get-Home-Itis

Get-Home-Itis is cockpit jargon for pilot anticipation and eagerness to get finished with the day's work. ASRS analysts include Get-Home-Itis as a diagnostic term when reviewing reports that demonstrate an over-eagerness to get home. "I let my desire to get to the airport overshadow good judgement," stated a commuter pilot who opted to land straight-in at a non-tower airport without bothering to call in on UNICOM. A near-collision occurred. An air carrier first officer, reporting on a runway transgression, stated that "The Captain had home-itis. On our arrival at home base, he was taxiing faster than normal to get to the gate. Next time I'll ask, 'Where's the fire?'" In perhaps the ultimate embarrassment, one chagrined flight crew was informed that they had exited the aircraft with an engine still running at the gate.

General aviation pilots are not immune to the home-itis disease. As one rueful general aviation pilot reported:

> "My ground speed dropped off... I had a choice of either landing to refuel or to continue. I decided to press on. At 4 miles out, the engine went to idle. At 2 1/2 miles out, the engine stopped."

Get-Home-Itis is a disease that can also afflict a pilot who is fresh and rested, but we are willing to bet that fatigue both occasions and compounds the problem.

Complacency

Perhaps the most welcome sight in aviation is the familiar home airport coming into view on the horizon, especially after a long, hard series of downline flights. However, the subtle slide into psychological letdown (frequently cited in the last-flight-of-the-day narratives), can lead to error, embarrassment, or hazard. Noted one reporter:

> "Having the field in sight and being very familiar with local area, I came off the gauges and busted my altitude."

Another reporter, in reflecting on his deviation, noted:

> "I was complacent about checking the approach plate and in flying our normal procedures."

A captain who strayed off the route was apologetic:

> "Since it was the last leg home, I put away my charts. Next time I'll leave them out."

Cockpit Management

The omission of cross-checking and crew concept monitoring duties was a common factor in last-flight-of-the-trip circumstances. "We were relaxed," admitted one reporter. "We were too relaxed," insisted another. Common errors include selection of wrong VOR and ILS frequencies, radials, and DME distances; incorrect comprehension and readback of clearances; and misinterpreted runway assignments. Pilots frequently cited psychological letdown in vigilance and cross-checking: "Not paying attention to what the captain was doing," "not monitoring the first officer's actions," and "the crew let down their guard... [and] lost backup monitoring."

Looking for Solutions

Awareness of the potential for each of us to be a victim of fatigue, complacency, and Get-Home-Itis is the first step in the cure of the disease.

Combatting Fatigue

Fatigue is insidious. Without realizing its progressive impact upon alertness and attentiveness, tired pilots drift toward passivity, inertia, and lethargy. In an increasingly competitive industry, air carrier pilots often cite scheduling as the major contributor to fatigue. There is little advice we can give except to eat well and get as much rest as possible. General aviation pilots often have more control over their schedules but should still plan for adequate rest periods.

Professionalism

By definition, complacency is not recognized a problem in the cockpit while the flight is in progress. Complacency as a factor in flight crew error is identified only in post-incident reflection. None of us is immune to complacency. Working hard to maintain a professional attitude at all times will go a long way in providing a degree of immunity from the affliction. (By the way, you do not have to be a fly-for-hire pilot to strive for professionalism; even the newest student pilot needs to develop a professional attitude.)

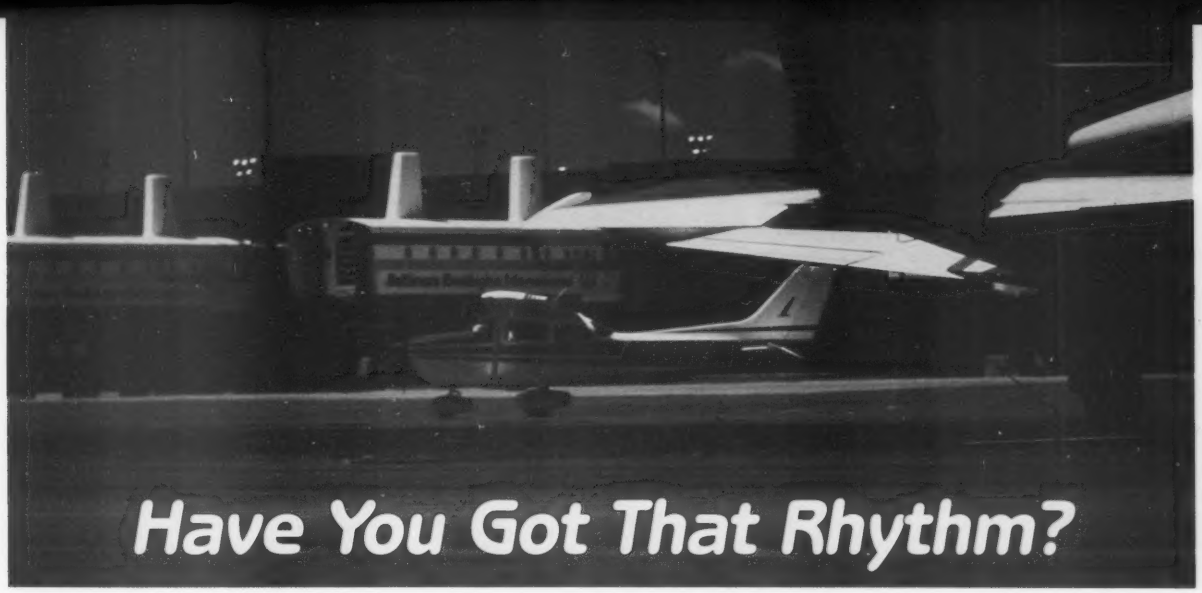
Cockpit Management

Maintain proper cockpit and flight crew monitoring and observe duty priorities. Projecting thoughts forward to post-arrival details distracts pilots from the tasks at hand.

It Ain't Over 'til...

> "The last leg of the flight should be flown in the same way as the first flight of the day, or else it might be the last flight in the pilot's career." ■

The Aviation Safety Reporting System is a cooperative program established by the FAA's Office of the Assistant Administrator for Aviation Safety and administered by the National Aeronautics and Space Administration.



Have You Got That Rhythm?

fatigue

It's more than just a daily clock; it includes flight safety

from *Palmetto Aviation,* a publication of the South Carolina Aeronautics Commission

Body functions are controlled by internal "biological clocks." While the mechanisms of these clocks are largely unknown, their effects are familiar to everyone. Walking, sleeping, eating, and elimination of wastes are regular everyday human experiences. Most people also note daily periods of alertness and periods of dullness. Such periods are normal and are related to swings of one to two degrees in body temperature. People are most alert when the body temperature is highest and least alert when the body temperature is at its low point.

For people who sleep at night and work in the daytime, their body's low temperature occurs about 3 to 5 o'clock in the morning. At this time such people are most prone to errors. Studies of airline pilots confirm that performance failures and human error accidents are most likely to occur early in the morning.

High-speed, long-range aircraft are now commonplace in the general aviation fleet. Crews on such aircraft can be subjected to rapid time zone displacement when traveling in easterly or westerly directions. "Jet lag," or desynchronosis, means that travellers' body functions remain on home time and, therefore, do not occur at the same times as do those of residents at the destination. Thus, for example, the traveller gets sleepy or hungry at inappropriate times. If the traveller stays at the destination long enough, the biological clock will gradually become reset to the new time. This resetting, or entrainment, takes place at the rate of about one hour per day for each time zone crossed.

Thus, if a California pilot flies to New York (three time zones), he or she requires about three days to adjust functionally to Eastern Time. The same readjustment time will be needed by a New York pilot flying to California, though less difficulty will be encountered adjusting to Pacific Time than to Eastern Time. This is because it is easier to stretch the day (east to west flight) than it is to compress the day (west to east flight). However, in either case the pilot may find it necessary to fly at a time of "circadian low" and should be aware that the tendency to be error-prone is greatest at that time.

Strict adherence to the practice of checklists is the main insurance against error. Two heads are better than one. With two-person crews, the checklist should be used with one pilot reading the items and the other checking the items; only clearly spoken responses should be accepted. Pilots flying alone should read and respond aloud to all checklist items.

Pilots who will not be at the destination long enough to adapt to local time should remain on home time as far as their activities are concerned. In extreme cases this could mean daytime sleep and breakfast at night, but it will, to some extent, prevent fatigue resulting from insomnia.

People experiencing jet lag can force themselves to carry out activities, such as going to meetings, shopping, etc., but they cannot force themselves to sleep when they are not sleepy. Tourists laying awake all night and then dragging themselves about sightseeing the next day is a fairly trivial problem; however, such a situation could be a significant problem for a pilot who must be in top form for a flight. In any case, pilots should never use sedative drugs [without consulting an AME] or alcohol in an attempt to cope with jet lag or insomnia. Likewise, use of stimulants such as amphetamines in an attempt to be "up" at the time of a circadian low period should be strictly avoided. Pilots should also remember that drug effects can wear off in flight, leaving the pilot in a worse condition than he or she might have been otherwise.

If at all possible, pilots should plan departure times to provide a desired arrival time. Of course, terminal or enroute weather forecasts may have powerful influences on departure times. The result may be that a departure or arrival

Continued on page 14

Piper Aircraft Corp.

Pilot Decision Making

by Tom Hamilton

A Superior Pilot is One who Stays Out of Trouble by Using Superior Judgement to Avoid Situations which Might Require Superior Skill

This is Part One of a seven part series that first appeared in Balloon Life *magazine in 1989 and was originally written for balloon pilots. We have left the lighter-than-air examples in because the overlying issue of pilot decision making affects all pilots, and the excellent information in these articles can be extrapolated to aviation activities other than ballooning.* ***—Editor***

A popular belief is that judgement is good, common "sense" applied to the making of decisions, especially correct decisions. "Sense" involves an intense awareness, realization, and understanding of all the factors involved in making a decision. Sense is generally seen as a person's ability to act effectively and positively in any given situation.

The most significant aspect of pilot judgement and decision making is the outcome. Judgement is not an end in itself but involves both a decision to act and a response—be it an action or even an inaction. Before taking action, pilots must consider all relevant interpersonal, aircraft, and environmental factors which have, or may have, an influence upon the decision-making process. Pilot judgement is thus a process which produces a thoughtful, considered decision relating to the aircraft's operation along with the ensuring action/inaction to that decision.

Aeronautical decision making is a combination of our ability and motivation. The former deals with our ability to act like a computer while the latter encompasses the external factors that influence behavior.

Ability is searching for and establishing the relevance of all available information regarding a flying situation, specifying alternative courses of action, and determining expected outcomes from each alternative. We can define ability, then, as *intellectual ability.* It relies on the pilot's capabilities to sense, store, retrieve, and integrate information. This part of judgement is purely rational and, if used alone, would allow problem solving in much the same manner as a computer. Ability comes from training, practice, and continuing education—the learning process. The more knowledge we have, the greater the resources on which we have to draw to evaluate a flying situation and specify a course of action.

The second part of our definition deals with motivation. The motivation to choose and authoritatively execute a suitable course of action within the time frame permitted by the situation. The word "suitable" means an alternative consistent with societal norms, and "action" includes no action, some action, or action to seek more information. In this second part is where the decision is made, and indications are that this process can be affected by motivations and *attitudes*. There is an implication that, in part, pilot judgement is based on tendencies to use other than safety-related information when choosing courses of action. Pilots often consider non-safety items such as job demands, convenience, monetary gain, self-esteem, adventure, commitment, etc., before taking action. If properly developed, this part of pilot judgement would eliminate information unrelated to flight safety and direct the pilot's decision to the use of more rational processes.

Most accidents are credited to "pilot error," a large catch-all category to explain the cause of an accident. In Figure 1 is a breakdown by type of pilot error accidents based on information from the National Transportation Safety Board (NTSB) contained in bal-

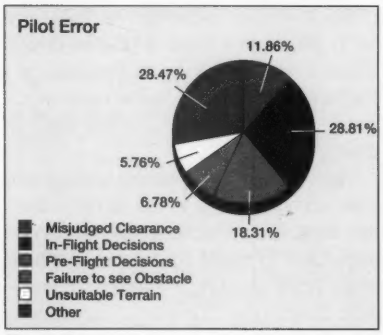


Figure 1

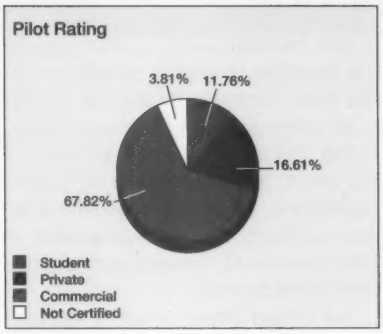


Figure 2

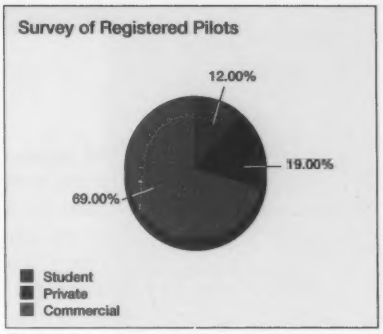


Figure 3

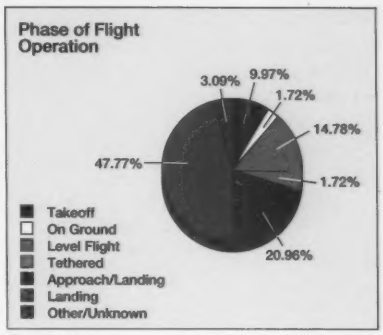


Figure 4

loon accident reports for a recent 20-year period. Pilot error, however, is an oversimplification for the cause of the accident. Pilots, after all, do not *intend* to have accidents. Pilots usually intend to fly safely, but they sometimes make decisional errors. Sometimes skill or luck will be sufficient to get them out of situations. The objective of this and subsequent articles, however, is to provide the pilot with knowledge to avoid situations that require the use of superior skill to overcome.

Accident Characteristics

Before we proceed and look at the risk factors to consider in aeronautical decision making, an examination of accident characteristics is in order.

Figure 2 shows the pilot certificates of those involved in the accidents. At first, it would appear that the commercial pilot is the most guilty of exercising bad judgement. However, the representation of commercial pilots in the figure is the same percentage of total pilots in the population base. Figure 3 represents a survey of current pilot ratings.

Phase of operation statistics can be found in Figure 4. Here one area of flight operation stands out. Approach to landing and landing phases comprise 69% of the accidents reported. [About the same composition for other aircraft.—Editor] This is a clear indication that this phase of operation requires greater ability and can be more adversely affected by motivation.

One other area to consider is recent flight experience in the previous 90 days. Although the statistical data over a recent five-year period would indicate that the fewer hours you had flown tended to result in a higher degree of risk, the database is too small to draw concrete conclusions because of other factors. Those other factors include the nature of the flight (training, pleasure, for hire, etc.), total pilot experience, and weather.

Elements of Risk

If we look at the decision making process (Figure 5) we find that inadequate skills and procedures and/or inadequate headwork in conventional decision making leads to "Mishaps." A review of accidents involving balloons will reveal that more than 90% of them are "pilot error." These "errors" fall into several categories which include errors of omission—failing to do something one should have done; errors of commission—doing something too soon or too late; and errors involving degrees of response—overreacting or underreacting. It is worth keeping these types of mistakes in mind when examining the decision making process.

Figure 5 shows the four elements of risk involved in a *situation*. The pilot, aircraft, environment, and type of operation combine to create the situation. Situational awareness is the accurate perception of the conditions affecting the balloon and the pilot during a specific period of time. It is knowing what is going on around you. There is a direct relationship between situational awareness and safety.

We have listed below some of the elements for each of the four risk factors. Can you think of others?

Pilot

- **Experience**—total time, last 90 days, type of weather conditions
- **Competency**—ability
- **Health**—minor illnesses, eating properly, alcohol/drug use
- **Fatigue**—lack of sleep, fitness, mental or physical
- **Attitude**—family or work problems, getting married, happy, angry

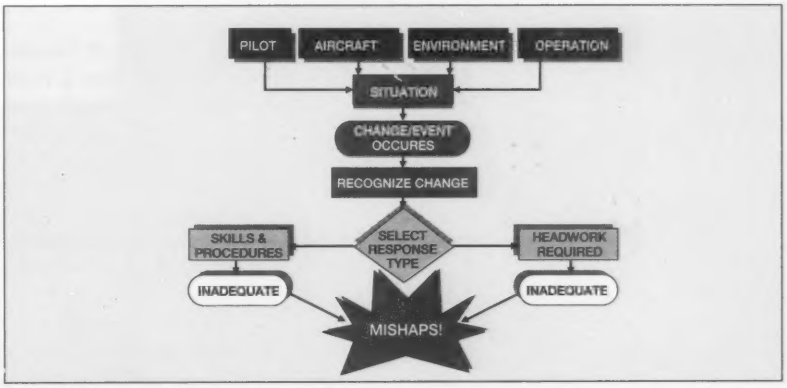


Figure 5

Aircraft

- **Airworthiness**—total time, status of inspections and AD's
- **Type**—single, multiengine
- **Size**—two seater, four seater
- **Accessories**—gauges, avionics, antennas
- **Fuel capacity**—at beginning of flight, end of flight, quality of fuel

Environment

- **Weather**—high pressure system, windy, front nearby, fog, clouds, turbulence
- **Airspace**—over town, agricultural land, near airport
- **Topography**—flat, rolling hills, mountains, sea level, high altitude, desert, trees
- **Takeoff/Landing Area**—grass, dirt, surrounding obstructions, size, weather conditions, accessibility, hazards to flight

Operation

- **Fun**—with friends or solo
- **For hire**—passenger, cargo, banner
- **Day**—visibility
- **Night**—experience
- **Heavy**—full load, high altitude, high ambient temperature
- **Light**—solo, cold weather
- **Instruction**—student and instructor experience, weather

This is certainly not an exhaustive list but a starting point for you to consider. Get together with other pilots and discuss what other elements enter into each of these risk factors. How does each affect the situation? What about the possible combinations?

The situation, of course, does not remain static. Situations are dynamic, and your ability as a pilot to recognize and react to those changes which are occurring is important. In Part Two we will examine Skills and Procedures and Headwork required in managing attitude, stress, risk, and crew.

Thinking about what might happen and planning for it helps the pilot to use superior knowledge to avoid situations that might require superior skill. ■

Our thanks to Mr. Tom Hamilton, publisher of Balloon Life *and author of this series, for permission to reprint this and subsequent articles. For subscription information contact Mr. Hamilton at 2145 Dale Avenue, Sacramento, CA 95815; (916) 922–9648.*

Product Liability: A Case Study

Continued from page 1

Both sides appealed. The appeal court reversed the judgement and sent the case back to the trail court for a new trial, which would permit the jury to find in one "special verdict form" the negligence of the parties and non-parties, whether original or crashworthiness tortfeasors.

Before the new trial, Piper asked the trial court to dismiss the case on the basis of federal preemption. Piper argued that a jury should not be permitted to find that the design of the *Cub* was negligent because the *Cub* met all of the FAA design requirements, including those relating to pilot visibility and seat restraint systems.

The trial court rejected this argument, and Piper again appealed. On appeal, Piper again urged that federal preemption is a bar to the pilot's claims of negligent design. In its appeal brief, Piper also addressed the alleged defectiveness of the tailwheel design by tracing the history of the *Cub* and the tailwheel design.

The lawyers for the injured pilot argued against federal preemption. Recovery for personal injuries because of negligence or product defects has traditionally been a matter of state, not federal, law. That includes injuries arising from air crashes or aviation products. In enacting the Federal Aviation Act, Congress never intended to take this away from the states, the plaintiff's lawyers said.

And so the arguments go.

In April of 1992, the Aircraft Owners and Pilots Association filed a brief amicus curiae (friend of the court) contending that "in the particular circumstances of this case, involving an aircraft design certified by the Federal Aviation Administration and proven over a long history of safe flying, the plaintiff's product liability claim based on an alleged failure of the manufacturer to exceed federal design and safety requirements is preempted by paramount federal law and regulation in the field of aircraft design and safety.

Without federal preemption, juries across the land could, in effect, require the redesign of aircraft whose design has been approved by the FAA. Juries redesigning aircraft is not a good thing.

The FAA also filed a brief as friend of the court, arguing in favor of federal preemption, as did other general aviation organizations. The Association of Trial Lawyers of America submitted a brief to the contrary.

The United States Court of Appeals for the Tenth Circuit on February 16, 1993 filed its opinion in Cleveland v. Piper Aircraft Corporation. The opinion rejects Piper's contention that Federal preemption should bar a state law claim of defective design of an aircraft that met FAA standards. The appeals court said that the plain language of the Federal Aviation Act suggests that Congress intended that the Act have no general preemptive effect. The case will now proceed to a new trial in the United States District Court for the District of New Mexico, based on an earlier appeal in which the trial court was found to have erred in instructing the jury about allocating fault among the potentially responsible parties.

It will be interesting to see how the case is ultimately resolved. ■

Mr. Yodice is AOPA's General Counsel. This article originally appeared in the December 1992 AOPA Pilot and is reprinted with permission.

Have You Got That Rhythm?

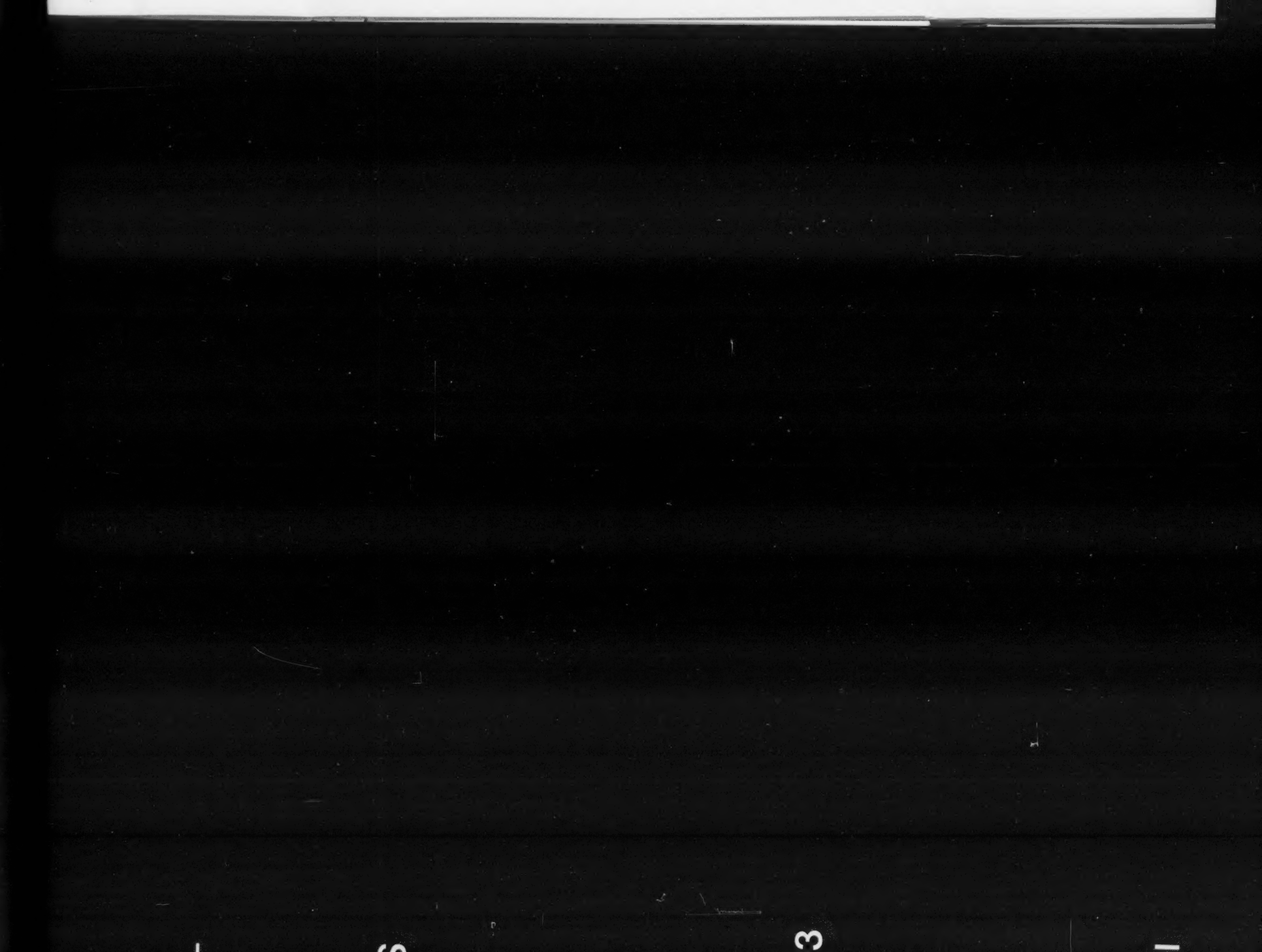
Continued from page 11

may be scheduled at a time of circadian low when the likelihood of human error is greatest. At such times errors of confusions and forgetfulness are most common. "Forcing functions" such as checklists, warning horns, stick shakers, flags, and lights are most important in combatting reduced alertness levels. Preflight procedures should always include checks to see that these safety features are present and operating according to specifications.

Checklists are for using! ■

PLACE
STAMP
HERE

Superintendent of Documents
Government Printing Office
Washington, DC 20402–9371



Boeing

Crew Coordination Problems

by Mary Edwards, Ph.D.

When we speak of Crew Resource Management, we tend to think only in terms of the flight crew. In airline operations flight attendants are part of the crew and, depending on the airline, may participate in CRM training with the flight crew. Many more private operators are using flight attendants, and they need to be trained as part of the crew also. As we see in this article, however, crew coordination problems still exist within the airlines, and we present this article to alert corporate flight departments as well. ***—Editor***

Crew coordination problems continue to plague commercial transport aviation despite increased awareness and the development of new training programs. More than 10 years ago, an article published in Flight Safety Foundation's *Cabin Crew Safety Bulletin* described some of the problems encountered in cockpit/cabin communications.

As examples of "rude, discourteous" behavior of the part of some captains, the author listed barring flight attendants from the flight deck unless specifically called there by the captain; keeping flight attendants in ignorance of the progress of the flight by refusing to pass on information about delays or weather conditions; and dismissing the requests of flight attendants for help in dealing with difficult passengers. The author attributed such behavior to a lack of good rapport between captains and flight attendants.

The failure of flight attendants to comply with direct orders from the captain and instances of orders "deliberately disobeyed" were attributed to organizational separation of flight deck crews from flight attendants, the former reporting to flight operations and the latter to a marketing or passenger service division. This separation was considered to be a major factor in the perception by some flight attendants that the captain was peripheral to their chain of command.

These situations also can be aggravated by large aircraft that "create a situation where the flight attendants are distant to the extent that interphone communications are necessary." (B-747's, for example, can have 20 different calling codes for cabin crew handset stations on the aircraft.)

This 10-year old article, based on firsthand experiences, has been followed by several broad-based studies on cockpit/ cabin communication issues. These studies identify two major themes: development of good interpersonal relations and recognition of the organizational context within which these interpersonal relations can be encouraged or modified, if necessary.

An FAA investigation into cockpit and cabin crew coordination conducted in 1988 reported "inadequate crew communication in emergencies, confusion over the sterile cockpit concept, inadequate instruction on the duties of the other crew in training, failure to properly secure the cabin for takeoff and landing, and inadequate support for staffing of the FAA inspector workforce."

Communication problems in emergency situations were linked to inadequate information from the flight deck concerning all the relevant features of the emergency, particularly the amount of time available for preparation of the cabin and its occupants to meet the emergency.

In non-emergency conditions, flight attendants often had insufficient notice from the cockpit of the time available to prepare the cabin for takeoff and landing, according to the FAA report. Communications problems originating in the cabin included violation of the sterile cockpit rule by requesting nonessential information at an inappropriate time and by not reporting to the flight deck matters that could be important for the safety of the flight.

The FAA report emphasized the need for *timely* and *specific* information to be communicated in each direction. Recommendations for action focused on training and procedures to improve communication and increase the awareness of both captain and flight attendant needs and duties.

The FAA report said, "During normal operations each crew needs to have a general idea of what the duties of the

other crew are so that they know when that crew is most fully occupied. Such knowledge helps to avoid inappropriate requests and unnecessary friction between the two crews. During emergencies it is imperative that each crew know exactly what to expect from the other crew so that they can work together effectively."

Why should crew coordination problems remain so resistant to solution? The answer may be that the solution has not yet been clearly defined. "Crew coordination" appeared in FAR § 121.417 in relation to emergency training, which must provide "instructions in emergency assignments and procedures, including coordination among crew members."

According to this definition, the regulations do no more than require the coordination of crews in emergencies. They do not include a requirement for coordination under non-emergency circumstances. Moreover, it is not the function of the regulations to describe how this (or indeed any other requirement) may be achieved nor how its success can be measured.

Training manuals (both operator and aircraft-specific) surveyed in FAA's study were found to offer more detail than contained in the FAR, but did little to explain the duties of one group of crew members to the other. Training for coordination was, for the most part, found to be confined to providing verbal instructions rather than providing opportunities for practical exercises. Joint training of flight deck and cabin crews was rare.

According to FAA's report, "All of the flight attendant manuals examined in this study stated that in the event of an emergency, the flight attendant in charge should ask the captain about the nature of the emergency, the time available to prepare the cabin, and special instructions (e.g., what the bracing signal will be). Very little, if any, information is offered on the duties of the flight attendants in the flight operations manuals."

Another possible reason for the failure to solve this problem can abe drawn from the following statement contained in a 1988 advisory circular on the subject: "in certain circumstances it is important for flight crew members and flight attendants to act as one cohesive crew, even though they are trained, scheduled, and generally regarded as two independent crews. When it is necessary to act as one crew, the activities of the cockpit should be coordinated."

But this is precisely where the problem lies. it is very difficult to "act as one cohesive crew" in "certain circumstances" while for the rest of the time there are "two independent crews." Furthermore, the circumstances in which coordination is required extend far beyond relatively rare emergency situations. The FAA report emphasized that coordination is required throughout the flight from takeoff through cruise to landing. Thus it is neither wise nor practical to attempt to confine coordination to one small area.

Organizational Definitions Create Two Crews

The perception of two distinct crews, cooperating only under rare circumstances, is an accurate reflection of reality within some airlines. There are clear organizational differences between the two crews. The flight deck crew reports to the airline's flight operations department while, typically, the flight attendants do not. The working area of the cabin crew is public; the flight deck crew's is private. There are differences in status, power, and salary that favor the flight deck and that are reinforced by the sex differences between the two groups—most pilots are men and most flight attendants are women.

Pilots are perceived to be dealing with state-of-the-art technology in their working lives while flight attendants are perceived to be dealing largely with what could be considered "domestic" activities—serving food and caring for those who are fearful—indeed, confirming the stereotyped feminine images of flight attendants that have been used extensively for marketing purposes. Pilots are thus perceived as essentially proactive—they make things happen.[Indeed, many flight attendants perceive themselves as "left out."—Editor] Flight attendants are perceived as essentially reactive to an agenda determined by others.

While flight attendants would not be expected to share these perceptions, some flight deck crew members may be prone to accept such stereotypes. "In fact, pilots are often surprised to learn the extent of the flight attendant's training and responsibilities," according to the FAA report.

An example deriving from these differences in status might be the reluctance of flight attendants to report to the flight deck any unusual events or difficulties. They may feel that any contribution they could make may appear to be superfluous because they assume that the flight deck crew already has all the information required. In their own difficulties, they may have problems in realizing when it is necessary to seek assistance. The boundary between persistence in the face of odds and foolhardy refusal to seek help at the appropriate time is usually only evident after the fact.

In this context the failure of some of the attempts at joint exercises noted in the FAA report and their subsequent abandonment is not surprising.

An instruction-based training program aimed at improving communication is often not enough to overcome obstacles in cockpit/cabin crew communication. A different approach is required that involves a major reappraisal of the aircraft as an organizational system.

Task Interpretation Can Foster Problems

Status differences are not the sole barrier to effective communication between flight deck and cabin. The way that the primary task of each group is interpreted also creates difficulties.

If the task of those on the flight deck is regarded only as "flying the plane," then this is consistent with the view that the fuselage is just "the piece in the middle that keeps the tail on." Such a view relegates "timely and spe-

cific" communication with flight attendants to a low priority.

For flight attendants it is not so much the interpretation of the task as the perception of the task that is the problem. While the statutory function of the flight attendant is to safeguard passengers, service—not safety—is generally by perceived as primary.

This is reinforced by the organizational separation of safety training from service training; by the longer periods of time devoted to service training; and by the image of the flight attendant that emphasizes serving passengers' needs rather than performing an effective safety role. (The use of a video recording rather than the live cabin crew in the aircraft to deliver the statutory safety briefings may serve to distance flight attendants further from the safety role.)

In this context, safety is regarded as separate from the routine activities of the flight and is concerned solely with unusual events involving emergency drills and equipment. An integration of the service role within the context of safety is needed so that safety permeates all flight attendant activities. This would enhance the professionalism of the job of flight attendant and facilitate the communication between the flight deck and the cabin.

These changes in task interpretation would have major implications, not all of which may be welcomed. A greater demand would be placed on the management skills of pilots because of their more direct involvement with the cabin crew. The greater safety awareness developed among flight attendants is likely to lead them to become less tolerant of inadequate or damaged equipment. Above all, such changes would have implications for training and for the relationship between the different organizational functions that provide the training.

Effective decision-making, [one of] the primary objective[s] of CRM, depends on the use of all available relevant information. But it must first be elicited from those who can provide it. The central focus of CRM is therefore on clear and unambiguous communication, on conflict resolution, on self-awareness and awareness of others, and on an integrated team performance.

Piper Aircraft Corp.

It is well known that there are many obstacles to effective communication, and CRM addresses them. There is a need for listening skills, which in turn demand authenticity on the part of the listener, and for skills in expressing views that may not be popular, which in turn require assertiveness on the part of the speaker.

CRM training is [largely] based on the active participation of trainees in role playing and simulation rather than on passive listening to lectures. The video taping of role playing exercises allows for their subsequent analysis by group members and facilitates the giving and receiving of criticism in a non-threatening environment. The aim is for the attitudes of openness and assertiveness developed in training to be transferred to the operational context.

The problem of cabin/cockpit coordination has a long history of neglect, and the 1988 FAA report documented several serious cases. Practical problems of scheduling and disparities in numbers (typically, there are far more cabin crew than flight deck crew) are often cited as reasons for not implementing joint training.

Only five airlines listed in the FAA report had experience in joint training of crews. Two airlines had discontinued the training because the presence of members of the other crew was found to be either disruptive or inhibiting. In three airlines, however, the joint training experience was positive, leading to increased mutual understanding of duties and the practical benefit of immediate detection of incompatibilities in manuals.

The FAA report noted that the scheduling of joint training is less problematic for smaller airlines than for larger operators, which may have different training sites for crews and different recurrent training cycles.

There is now an opportunity for a paradigm shift. The increasingly sophisticated technology on the flight deck has led to changes in the pilot's task from the exercise of psychomotor skills to the management of a complex system. These changes have been technologically determined. Therefore, there is a certain lag in the corresponding changes in selection and training, although the adoption of CRM as an important part of pilot training suggests that this situation is improving.

Because the role of a manager as well as a pilot is required on the flight deck, the possibility arises of designating the managerial role in a creative way to take into account all the human resources in the aircraft. This involves integrating the cabin crew within the captain's sphere of operations.

When trained as a manager, the captain is more effective in exercising his or her responsibilities both on the flight deck and in the cabin. This does not preclude the continued delegation of some coordination tasks to senior cabin personnel, although the context within which the delegation takes place will have changed.

The advantage of this approach is that the captain's overall responsibility, already grounded in law, is explicitly recognized in a practical (and safety-directed) way. ■

This article is reprinted from the November/December 1992 edition of Cabin Crew Safety, *a publication of Flight Safety Foundation, 2200 Wilson Boulevard, Suite 500, Arlington, VA 22201–3306; (703) 522–8300. Dr. Edwards works in the area of human factors and is co-author of a book called* The Aircraft Cabin—Managing the Human Factors.

Piper Aircraft Corp.

CORPORATE FLYING

A Different Standard does not Mean Less Safety

by H. Dean Chamberlain and Phyllis Anne Duncan

What comes to mind when you think of corporate aviation? The image of a sleek *LearJet*, Cessna *Citation*, or Beech *Starship* from which executives emerge to attend top-level meetings at places like Aspen or Palm Springs is long-separated from reality. The truth is that not all corporate aircraft are bizjets; many are *King Airs* or *Barons*, *Navajos* or *Senecas*, Cessna 210's or even 172's. And the jobs of most corporate pilots certainly may not be fodder for "Lifestyles of the Rich and Famous." Many corporate executives help themselves to coffee from a thermos or doughnuts from the convenience store (usually picked up by the copilot on his or her way in for the predawn preflight). Many corporate pilots cool their heels in small airport lounges waiting for their executive passengers whose meetings have gone longer than expected, subsisting on peanut butter crackers and colas from the omnipresent vending machines, catching naps on oversprung sofas, and hoping the weather will improve so that he or she won't be faced with a "fly or be fired" dilemma. Not so glamorous a picture at all.

The further reality is that corporate flying, just like any flying done for a living, is hard work, accomplished by professional pilots. The result is that corporate flying as an aspect of general aviation enjoys a safety record envied by some airlines and commuters. But there are still a number of pressures corporate pilots may be subjected to that could affect that sterling safety record.

One external pressure may be their employer's lack of *aviation* knowledge and experience. Although their business acumen may be legendary, some corporate executives may have little or no experience in the day-to-day operations of a flight department. Some CEO's may view the company aircraft and pilots as a "perk" to be used for their convenience, and many may find it difficult to accept when one of their employees (i.e., the pilot) says that that expensive asset can't move because the weather's not good enough or the MEL won't allow flight with certain equipment inoperative.

Another pressure may be largely internal—pilot attitude. Corporate pilots can be gray-haired captains retired from the airlines or the military and accustomed to calling all the shots in the cockpit. Corporate pilots can be men or women building time to qualify for a commuter or airline job. They could even be those who didn't make the cut for those high-profile flying jobs and who took any flying job that was available. Whatever type they fall into, corporate pilots fly for a living because it is what they want to do, and they know for every one of them there is a newly certificated commercial pilot or laid-off airline pilot ready to take his or her position. Sometimes that leaves a corporate pilot little choice in a "fly or be fired" situation: Whose rules do I follow—the ones the FAA has written down and my own good judgement or the unwritten ones of the person who signs my paycheck? With so many hidden agendas, this is a difficult decision for many of us to contemplate. Making the wrong choice can and has cost lives.

Above all, corporate pilots are professionals as much as any airline pilot. One difference may be corporate structure. Pilots of large airlines know they generally have support for safety decisions all the way up the corporate ladder. When there is any question about a situation or a procedure, the airline pilot consults the company's operating manual—required by the FAR—and there is the answer in black and white. Not all corporate pilots have the luxury of that organizational support or the benefit of written company procedures that all employees must follow. Corporate flight departments may not be the company's primary business; they exist for the company's benefit and efficiency. If the airplane sits in the hangar for a reason management cannot fathom, they see no benefit and little efficiency.

What we have been trying to do up to this point is identify some of the potential problems or questions faced by both flight crews and companies that have small flight departments managed by executives not familiar

with aviation: When is it safe to fly? Who is responsible for making that decision? Who is responsible for crew supervision and crew conflict resolution? And who is responsible for safety? These are also some of the questions we will explore as we review the report on an accident that killed nine people. In December 1991, a corporate Beechjet 400 crashed shortly after taking off in VFR conditions and while waiting for an IFR clearance. The accident occurred about 9:40 a.m. EST when the aircraft struck the side of a mountain about six miles west southwest of Rome, GA. At the time of the accident, the aircraft was operating VFR beneath a 1,000-foot overcast and was waiting for an IFR clearance that was on file. Visibility was a reported 10 miles, although another pilot flying an approach to the Rome airport at the time of the accident reported reduced visibility west of the airport.

Before we go in depth into the particulars of the accident, we need to review the regulatory background of corporate flying.

Regulatory Requirements

Because they do not "hold out to the public" for transportation, corporate flight departments operate under FAR Part 91, General Operating and Flight Rules. However, if the corporate aircraft is a large (more than 12,500 pounds), turbine-powered (turboprop or turbojet), multiengine airplane, FAR Part 91, Subpart F provides additional requirements. Furthermore, if that large airplane has a seating capacity of 20 or more or a maximum payload capacity of 6,000 pounds or more, then the operating rules of FAR Part 125 apply in addition to FAR Part 91 (although the requirements of FAR Part 125 supersede Subpart F). The company would have to apply to the FAA and meet the certification requirements for a FAR Part 125 operating certificate. FAR Part 125 is structured along the lines of FAR Part 121, but FAR Part 125 is different from FAR Part 121 in many of its requirements because corporations will be operating the aircraft for *private carriage*. Meeting all the various requirements of FAR Part 125 might be overly burdensome for a small corporate flight department, so the FAA can issue a letter of deviation authority, which provides relief from all or part of FAR Part 125. Before the FAA issues such a letter, the operator must justify the request and show that the operator can achieve "an equivalent level of safety" when operating solely under FAR Part 91 (full deviation) or appropriate sections of FAR Part 125 (partial deviation).

Consequently, the vast majority of corporate aircraft are operated under FAR Part 91, either by virtue of their configuration or by a letter of deviation authority. FAR § 91.501(b) lists the types of operations that can be conducted under Subpart F. Subpart F operators are also subject to the remainder of FAR Part 91 (unless an exemption permits otherwise); however, aircraft that are *not* large, *not* turbine-powered, *not* multiengine, and *not* airplanes are subject only to FAR Part 91, Subparts A-E and G-J.

Does this mean that corporate aircraft operate under a lesser standard? When reviewing the requirements of FAR Part 121 and FAR Part 91, Subpart F, an initial opinion might be, "Yes." But it is necessary to look at the context of the different types of operations—private versus public carriage. Because they do not provide transportation to the public at large, corporate operators are held to a standard appropriate for private carriage. A corporate flight may involve a half-dozen corporate executives rather than half a thousand vacationers, but the responsibility for a safe operation in the nation's airspace system is the same. For the most part, corporate management and certainly corporate pilots take that responsibility seriously. At a given time, the worth of the executives on board the aircraft, in terms of future productivity for a company, may well exceed the cost of the machine itself. A whole wealth of corporate talent and corporate knowledge could be lost in a single instant, and non-paying passengers are no more expendable than paying ones.

Important Questions

It is not our intention to reprint the entire NTSB report on the Georgia accident, but we do want to highlight some questions the report raises. Before we try to address some of those questions, it is important to iterate that FAR Part 91 VFR rules should have provided adequate protection for this flight while the crew waited for the IFR clearance, but for some reason, the crew failed to maintain a minimum safe altitude in accordance with FAR § 91.119—obvious from the fatal impact with terrain.

The first important question is who is responsible for ensuring safety of a flight? Any pilot will automatically say that the pilot-in-command is responsible. But what might a company executive say about responsibility for his or her expensive aircraft? Would an executive with little knowledge of the FAR be willing to allow the pilot-in-command to make the final decision on that aircraft's operation? What does the FAR say?

FAR § 91.3 states that, "The pilot in command of an aircraft is directly responsible for, and is the final authority as to, the operation of that aircraft."

You can't get much simpler than that. But wait a minute. What if the pilot-in-command fails to fulfill that responsibility? What if the pilot failed in that responsibility because the company president or other highly placed executive felt it was his or her authority? What is the company president's role in the operation of the company aircraft? It seems almost too simple to say the pilot flies and the management takes care of all the other business. Obviously, you can't have the board of directors debating in the cockpit on whether to land the airplane, but you can have that same group in the board room deciding how the company's flight department will operate. Rather than a negative situation, this provides an opportunity for the flight department to educate management on the FAR and the importance of good operating procedures.

This is also an opportunity to go above and beyond the FAR in corporate aviation by establishing written

flight operating procedures that all employees agree to and will abide by. Company policies cannot conflict with a FAR requirement, but they can be more strict. For example, FAR Part 91 operations have no requirements for flight/duty time restrictions, but a company policy might go beyond that and require eight hours of rest in a 24-hour duty period. Written procedures can and do establish a "chain of command" and confirm who is responsible for what in a flight department. What the non-aviation people must understand is that the pilots have the flight skills and knowledge and experience, and those cannot be usurped by non-aviators. (It would be like the pilots trying to tell the marketing director how to do his or her job. Imagine how well that would go over.)

Many corporate flight departments have written procedures because of insurance requirements; not following procedures may mean losing coverage. The advisability of small flight departments having written procedures is illustrated by several aspects of the Georgia accident.

Accident Analysis

The company that owned the Beechjet had acquired a flight department when it bought out a chain of rival food stores in Alabama. The flight department then consisted of a Beech *King Air* and the two pilots involved in the accident. The company upgraded to the Beechjet and sent both pilots for company training for that aircraft. At the time of the accident, the two pilots had been flying together for about three years. Both held ATP certificates and had no record of any FAA enforcement action or any other accidents or incidents. The 59-year-old captain had a reported 16,000 hours with about 850 hours in turbojets, all in the Beechjet. The 27-year-old first officer had 3,100 total hours with about the same amount of turbojet time. All of his jet time was also in the company aircraft. Whenever either pilot was not available to fly because of illness, vacation, etc., the company would hire local pilots to fill in for the missing crew member. Some of those pilots provided statements to the NTSB that reported an apparent conflict between the captain and first officer. According to the statements, the captain reportedly would take chances by going below minimums on an approach to get his corporate passengers into a particular airport, or he would scud run under a ceiling for the same reason. Some said the copilot, whom they described as a professional, "go-by-the-book" type of pilot, felt very uncomfortable flying with the captain.

The substitute pilots also stated the copilot told them that when he was flying or landing, the captain would occasionally override him on the controls for no apparent reason. One statement included an alleged comment from the copilot that he (the copilot) thought the captain's flight habits would kill them.

According to some of the other statements, the copilot had considered going to the FAA about the captain's flying habits but was afraid he would also be implicated since he was aboard as a crew member at the time of the alleged incidents. The copilot thought that an FAA investigation might jeopardize his own chances of becoming an airline pilot. He was also afraid to quit for the same reason. These witnesses also stated that the copilot had felt ignored when he had raised safety issues to company management. However, in his statement to the NTSB, the executive denies the copilot told him anything.

Perhaps a company written procedure for elevating safety concerns that held the respondent accountable for some action might have at least assured the copilot his case was being heard. If the company procedures had included a process for reporting safety concerns, say, through the Aviation Safety Reporting System, the copilot's fears of FAA enforcement action could have been alleviated. There is also the FAA Safety Hotline (1–800–255–1111) which allows people employed by aviation related companies to report unsafe activities or non-compliance anonymously. The FAA is required to investigate every report.

On the day of the accident, the investigation implies that the crew may have departed VFR to keep to some kind of schedule. Again, the company executive contradicts these statements. In his statement he said that the crew was never under any type of pressure to maintain a schedule. However, employees of the FBO servicing the aircraft, in their statements to the NTSB, overheard the executive passengers talking about having to depart quickly. Company procedures outlining minimums for departure and landing and iterating that safety comes before schedule may have precluded such a contradiction but more importantly may have alleviated imagined pressure from a desire to "please the boss."

VFR Charts

Another interesting point brought out in the investigation where a written company policy may have prevented an accident was that there were no VFR sectionals on board the aircraft although the crew took off VFR. VFR charts would have topographically shown the location and heights of the nearby mountains. Although VFR charts are not required for IFR flights, current VFR charts provide an important safety feature on any flight. VFR charts are the only source of terrain elevation information needed for determining minimum safe altitudes for off-airway IFR direct flights outside terminal areas. If a written company policy had called for the carriage and use of VFR charts, might one of the pilots have noted the specific location of the terrain and been able to avoid it? Impossible to say definitely, but it's a lesson the rest of us can now learn the easy way.

Another consideration is the VFR departure. Apparently, the crew could not contact ATC from the ground to obtain the IFR clearance and so departed VFR to get airborne to have better communications capability—a time-honored and universal practice. But the problems with communicating on the ground may have been caused by the high terrain, and perhaps this should have raised a note of caution before a VFR departure and a flight beneath a 1,000-foot ceiling. If the crew could not communicate directly

Piper Aircraft Corp.

with ATC while on the ground, the captain could have requested an IFR departure clearance with a clearance void time by phone. With such a clearance, the flight could have departed IFR and contacted ATC once airborne. ATC specifies that if the aircraft has not departed by the time specified in the clearance, the clearance is canceled. This procedure allows pilots unable to contact ATC from the ground to depart IFR. Once airborne, the pilot checks in with the designated ATC facility. If the pilot does not takeoff within the specified time, the pilot must notify ATC as directed in the clearance. If the pilot fails to notify ATC, ATC considers the flight overdue 30 minutes after the clearance void time and will start search procedures, stopping IFR traffic for one hour in order to locate the "missing" aircraft. A pilot taking off after the clearance void time is operating without an IFR clearance and must remain in VMC or be in violation of FAR § 91.155 and/or 91.173. Would a written company policy requiring pilots to request clearances with void times have kept this flight out of danger?

Assertive First Officers

Although we have commented on the actions and responsibilities of the captain—because he was the PIC—at the time of the accident, the copilot was flying the aircraft. The aircraft's cockpit voice recorder (CVR) provided investigators some insight into the crew's decisions and actions before the crash. It also revealed the captain's comments and directions to the first officer and also the first officer's apparent timidity in responding to the captain. From the recorded conversations, the crew evidently knew they were flying near a mountain and that there were other aircraft flying IFR in the area. Based upon our interpretation of the report, the first officer appeared hesitant to fly in a direction where he could not see clearly, but the captain told him to turn right and to "bring it right on around." The copilot did not voice his concerns further, and a few seconds later the aircraft hit the mountain. The two pilots and all seven executives on board died on impact.

A lack of first officer assertiveness in the face of an intimidating captain has been cited in air carrier accidents and incidents. Air carriers sought to alleviate this with Crew Resource Management (more on that later), and many corporate flight departments have also subscribed to the crew as a team concept. Teamwork is just as important in a two-person flight department. Again, written procedures that support the first officer in safety considerations and an understanding management go a long way toward assuring first officers that they are part of the cockpit team, not just along for the ride.

The NTSB accident report sites the fact that the flight department of this company did not possess (nor were they required to) "... an operations manual, or policies and/or directives addressing the manner in which flights in the Beech 400 were to be conducted, the authority and responsibility of the captain and first officer, and management's support of and respect for the decisions made by the flight crew." We have tried to set forth some specific areas where official company policies and procedures might have prevented an accident.

Developing Procedures

For corporate aircraft operators who want to develop their own FAR Part 91 flight guidelines, the operating requirements in FAR Part 135 (e.g., training programs, operations manuals) could serve as a good example. Also, many manuals are available commercially, and many airlines, commuters, and airline management consultants offer manual production services for a fee. FAA inspectors may provide advice on how to structure or produce policies and procedures appropriate for corporate operations, but they do not approve such documents. Since written procedures are not required for FAR Part 91 operations, company operating policies could only be enforced by company executives or a "chief pilot" in the flight department—not by the FAA. (FAA inspection and surveillance of corporate operators may be included in a FSDO's annual work program; tasks concerning certificated operators take precedence.)

Having a good set of rules is important, but the rules must be developed by aviation professionals (i.e., the company's pilots) and understood by both the flight crews and the executives who use the aircraft. Executives must also know the company's policies and procedures concerning its aircraft because they need to know what operations are permitted so that they do not ask a crew to do something that may go contrary to a FAR.

As noted by NTSB, in addition to the operating guidelines, there should be a procedure for crew members to voice their safety concerns to management. Knowledgeable executive-passengers can then make informed decisions regarding the complaints based upon

their own guidelines and their knowledge of the FAR. The need for open and accurate communication is vital for safety. As the FAA has discovered, whenever there is a breakdown in communication among everyone involved in an activity, there is a potential for a breakdown in safety. In the case of this accident, perhaps if there had been some corporate procedure in place to handle the safety issues raised by the first officer, that first officer's statements to his friends might not have been so prophetic.

Corporate CRM

The apparent lack of communication in the cockpit and the lack of assertiveness of the first officer might have been alleviated by a company training policy that required crew resource management (CRM) training. This crew appeared to be operating under the pressure of the ostensible conflict between the captain and the first officer, discussed by many of the witnesses. The FAA and the aviation industry have long cooperated to develop better ways for crews to learn how to work together because studies have shown that human error is a contributing factor in about 70% of all air carrier accidents and incidents. That percentage increases for general aviation, of which corporate flying is a part.

Some of the techniques developed to minimize human error in the cockpit are outlined in FAA Advisory Circular (AC) 120–51A, "Crew Resource Management Training." Available from the FAA, the AC was written to help air carriers and FAR Part 135 operators develop, implement, and evaluate CRM procedures to train crew members how to work as a team instead of as individuals. Most of the CRM concept is adaptable to corporate operations. CRM training also studies how individual crew member attitudes and behaviors impact safety. As the AC says, CRM focuses on communication skills, teamwork, task allocation, and decision making in the cockpit. A vital aspect of learning how to work together is the acknowledgement of the important role the first officer has in safety. Past accident investigations have shown that an autocratic captain who fails to use the knowledge and skills of his or her first officer (or a first officer who won't speak up) often kills both of them in an accident. CVR tapes have recorded first officers' futile comments regarding their inability to break a chain of events that inevitably led to an accident. The area of first officer authority and responsibility is also discussed in AC 120–51.

Another AC, 60–22, "Aeronautical Decision Making," provides a systematic approach to risk assessment and stress management in aviation. It also illustrates how personal attitudes can influence decision making as well as how those attitudes can be modified to enhance safety and teamwork in the cockpit. There is no reason why corporate flight departments can't make use of the information provided by these resources. Commercial flight training companies offer CRM training for all kinds of flight operations, including corporate aviation.

Another important part of the CRM concept is that the crew trains together as a crew. As noted, the company involved in the accident hired local pilots to replace either the captain or first officer when they were absent. These pilots were likely highly qualified, but they may have lacked the experience of team building. In this instance the second pilot is only along for the ride to satisfy an insurance or a FAR requirement. This is highlighted by another corporate accident, also in 1991, in San Diego, CA. For some reason the copilot of a bizjet flying the band of country singer Reba McIntyre's decided to return home on another company aircraft. Another company pilot was elected to fill in, but there was no evidence that this copilot was type rated in the aircraft, a DH-125. (For a FAR Part 91 operation, the regulations do not require a type rating although he or she would need a check as per the requirements of FAR § 61.55; however, this raises the question of how much help the inexperienced copilot would have been to the captain in an emergency. Consequently, in many corporate flight departments company policy or insurance companies sometimes require type ratings for copilots.) In this accident the type-rated captain with an ATP certificate had over 15,000 total hours with 150 in make and model. The copilot was a commercial pilot with 1,750 total hours; he had a flight instructor certificate and multiengine and instrument ratings. The aircraft's owner described the captain as a very experienced and outstanding pilot. However, he said that the captain had flown many hours solo ferrying aircraft and was the type of pilot to do everything on a flight.

(Ironically, this aircraft also departed VFR to obtain an IFR clearance and also without VFR charts on board, then struck a 3,300-foot mountain 172 feet from its summit. Two crew members and eight passengers died.)

Conclusion

Those of us who write this type of accident analysis article have the benefit of all that 20/20 hindsight. It's sometimes too easy to say the pilots or the company might have, could have, should have done this or not done that. Or the FAA should have, could have, ought to have, ought not to have done a whole host of things. The fact remains that human errors that could have, should have been avoided have cost the lives of talented people in corporate cockpits and passenger compartments. What corporate flight departments must do is learn from these aberrations that occurred in Georgia and California so that the safety record that is so treasured remains enviable.

Developing written operating procedures and/or contracting for CRM training for a corporate flight department might seem tedious and expensive, especially when there is no requirement for any of it. Corporate management, perhaps, needs to consider if that unrequired manual or training program is really superfluous in terms of their safety record and the human resources carried on board that corporate "perk." ■

[AC's 60–22 and 120–51 are free from DOT General Services Section, M–433.2, Washington, DC 20590.]

FAMOUS **FLYER**

Augustus Moore Herring
—Genius or Bungler?

by Louise Oertly, *Associate Editor*

The hopes and dreams of many men were shattered on a cold, windy day in December—the 17th day of 1903 to be exact. That was the day when the Wright brothers made their memorable flight and proved that man could fly. Ironically, one of those men whose dreams had been shattered by the first manned, powered flight had been at Kitty Hawk with the Wrights only a year earlier. His name was Augustus Moore Herring.

Herring comes across as a rather an interesting character. He worked with some of the legendary names in early aviation but along the way acquired something of a reputation among them. When Octave Chanute suggested Herring's name as a glider pilot, Wilbur Wright expressed concern since several things he had "heard about Mr. Herring's relations with Mr. Langley and yourself seemed to me to indicate that he might be of somewhat jealous disposition and possibly inclined to claim for himself rather more credit than those with whom he might be working are willing to allow." This characterization aside, his contemporaries labeled him in turn a genius and a bungler.

Beginnings in Aviation

Born in 1865, Herring was 15 when his father, a wealthy Sommersville, GA, cotton broker, gave him a toy helicopter. His interest in aeronautics grew and, by the time his family moved to New York and he entered Stevens Institute of Technology in 1883, designing gliders interested him more than studying mechanical engineering. School records show he never submitted his undergraduate thesis on a design study for a marine steam engine, and his work in mathematics, analytical chemistry, and drafting was incomplete. According to Herring, his failure to graduate was that his thesis on the subject of flight was too visionary for the school to accept. The first of many differing points of view.

After leaving school Herring worked as an engineering consultant. However, in the economic panic of 1893 Herring's successful business went under with many others. He eventually found work as a chainman on the New York Central Railroad. Octave Chanute, who had been correspond-

ing with him about Herring's experiments with a Lilienthal-type glider, tried unsuccessfully to find him a job better suited his talents and finally hired him to build a series of gliders. December 1894 marked the beginning of an eight year on-again-off-again association between Chanute and Herring.

Langley Connection

Barely six months after Herring began working for Chanute, another offer came his way. The Smithsonian's Samuel Langley visited the young New Yorker and was highly impressed by his work. So impressed, in fact, that he made him a job offer of $150 a month as overseer of the work in aerodromics (defined in the dictionary as the art or science of flying). Herring accepted right away—only he forgot to mention that he was already working for Chanute. Within five days of starting his new job in Washington, DC, Herring realized he had made a mistake. Langley was difficult to work for and made of habit of changing the specifications of a design after it left the drafting table. If the design did not work after that it was the fault of the engineer, even if he knew nothing of the changes. Conversely, Langley also took credit for anything that proved successful. By November of 1895 Herring resigned his position and asked Chanute for his old job back.

Back to Chanute

Herring moved this time to Chicago and started construction on two gliders—a Lilienthal-type of his own design and a multi-wing of Chanute's. By late June of 1896 the first trials took place at Miller, IN, about three miles from Chicago. Herring's glider lacked stability and control and, after several crashes, was damaged beyond repair. Chanute's multi-wing design was tested next. The principle of this design was opposite Herring's. Instead of the pilot shifting his weight to achieve stability, the craft's wings would shift on pivots to achieve stability in the wind. After some experimentation, the two men discovered the best combination for stability was five pairs of six by three foot wings stacked in front and one pair behind at the tail. The glider, affectionately known as because of its bug-like appearance, proved steady and manageable in winds up to 20 miles an hour.

After nearly two weeks of testing Chanute's band packed up and headed back to the Chicago workshop. In late August three gliders were ready for testing—William Paul Butusov's bat-winged *Albatross*, a rebuilt *Katydid*, and a Chanute-Herring designed fixed-wing biplane. The *Albatross* proved to be a disappointment; the improved *Katydid* almost doubled its previous performance; and the fixed-wing glider surpassed all expectations. Flights up to 359 feet in 14 seconds were achieved.

By mid-September of 1896 Herring and Chanute disagreed on how best to proceed. Herring felt powered flight was the next step, while Chanute felt more testing was necessary. Needless to say, the ever impatient Herring struck out on his own. Objective—powered flight.

On His Own

Unable to find other financial support, Herring used $150 of his own money to build a triplane with a compressed air-powered automatic control system. The craft achieved altitudes of 40 feet above his starting point and was capable of making controlled turns. In June of 1897 he shelved his plans when he was unable to raise further funding. Reluctantly, Herring went back to work for Chanute to help develop a five-wing multiplane glider, but after two weeks Chanute dismissed him convinced that Herring's "mind naturally revolts at following other men's ideas."

About the time that Herring accepted an engineering position at the Truscott Boat Yard at St. Joseph, MI, he had also received an order from Matthias Arnot for one of his 1896 gliders. Foreseeing the possibility of future sponsorship by Arnot, Herring upgraded the 1896 design and after successful test flights determined that the design was ready for powered flight. The question was developing the powerplant. Steam was unreliable, and internal combustion too long term a venture. Herring wanted quick results. The easiest and lightest solution was a simple two-cylinder compressed air powerplant which would power two five-foot propellers—a tractor and a pusher. The finished aircraft weighed 88 pounds and in October 1898 flew 73 feet at a groundspeed of five or six miles per hour. Herring was determine to upgrade the craft and fly it again the following spring. Over the winter he experimented with various types of engines, but his experimentation was all for naught when his workshop caught fire and all his hard work went up in flames.

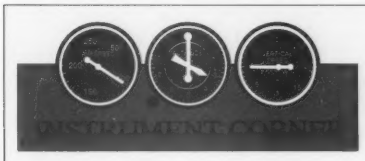
For the next few years misfortune continued plague Herring. Financial assistance was sparse, and Chanute attempted to take sole credit for the biplane glider design. Herring turned to motorcycle manufacture and the publication of a *Gas Power*, a magazine for motorist, as a more profitable enterprise.

Herring and Chanute would have one more joint venture together when Chanute contracted with him to reconstruct and pilot the 1896 multiplane glider. Joining the Wright brothers at Kitty Hawk in October of 1902, Herring and Chanute soon suspended testing when the superiority of the Wright *Flyer* became evident.

After Kitty Hawk

Herring never totally gave up on aviation. In 1908 he competed against the Wrights for the first military contract and for a short time had a partnership with Glenn Curtiss which ended up in a lawsuit that was finally settled after his death in 1926. Despite Herring's failure to achieve powered flight, he had contributed significantly to the development of aviation. Both Langley and Chanute used his "regulating" cruciform tail in their designs, and the 1896 Chanute-Herring glider descended from Herring's earlier rubberband- and steam-powered scale models. Before the turn of the century, he could also claim the title the most experienced glider pilot in the world.

Genius or bungler? You decide. ■



• Alternate Airport

Is it true that when filing an IFR flight plan, FAR § 91.169(b) requires that if there is no Terminal *forecast for the destination airport, even though it has a standard instrument approach procedure, you must specify an alternate regardless of the weather conditions?*

Thomas E. Miller
Ballston Spa, NY

The above example is not true. FAR § 91.169(b) states in part, an alternate is not required if the first airport of intended landing has a standard instrument approach procedure and for at least one hour before and one hour after the estimated time of arrival, the weather reports or forecasts, or any combination of them, indicate the ceiling will be at least 2,000 feet above the airport elevation; and the visibility will be at least three statue miles. FAR § 91.l69(b) states weather reports or forecasts, or any combination of them may be used to determine if an alternate airport is required. FAR § 91.169(b) does not require a terminal forecast from the destination airport. The answer provided is for Part 91 operations.

• Measuring Altitude

I have been unable to get a definite explanation of the following question. Several airspace designations have floors stated as above ground level (AGL) such as 3,000 feet, 1,200 feet, 700 feet, etc. About two thirds of the state of Ohio is fairly level with ground elevations of 800 to 1,000 feet mean sea level (MSL). However, along the Ohio River and over most of southeast Ohio the river valleys will be about 500 feet MSL while the surrounding hill tops average about 900 feet MSL. The valleys vary in width. From what point is the above ground level elevation measured when flying over such terrain? Logic would seem to indicate that it would be taken from the ridge tops. However, when flying over a wide valley, what is the base level? How is it figured in areas with mountains rising several thousand feet above valley floors with valleys only a few miles wide. Please help.

Stuart L. Faber
Cincinnati, Ohio

The answer to your specific question is above ground level altitude, or AGL, is the absolute altitude measured perpendicular to a particular point on the earth's surface such as the altitude measured with a radar altimeter. When you are measuring absolute altitude above ground level over a valley with a radar altimeter, the contour of the measurement will vary with the terrain. A measurement of 500 feet AGL over a hill top will be higher than a similar measurement taken in the middle of a valley when both are compared to sea level.

As the FAA's Instrument Flying Handbook says, altimetry involves more than simple measurement of height. The problem is when pilots talk about altitude, they may be talking about several different altitudes such as AGL, MSL, pressure altitude, true altitude, or absolute altitude depending upon how the altitude is measured. This is why it is critical for pilots to understand what altitude is being discussed since a misunderstanding could be fatal. This is also why pilots must know the minimum safe altitude needed for terrain avoidance for their particular operation. Pilots using the typical light aircraft pressure altimeter must also know its operating limitations to ensure an accurate altitude reading. For an interesting discussion on the dangers of incorrectly set pressure altimeters on international flights, please see the September-October 1992 issue of *FAA Aviation News.*

• Testing Standards

Ronald D. Drake's article, "How to Pass Your Next FAA Flight Test" is a good summary of the formal requirements for a test, but because it ignores all except the formal requirements it fails, in the end, to be any help in actually passing the test. It merely shows some ways of failing the test; thus, it in effect says, "all you have to do is get it right, and from now on it's not our fault if you fail."

The reality is that this is a test, and the examiners or inspectors are humans with human defects. I gave up instructing—even though plenty of evidence showed that I was a superior-quality teacher much in demand—because I have a poor examination temperament, and at my last renewal collapsed into stupidity at the first question. I do not blame my examiner for that: you can scarcely expect better than Clayton Scott. But some examiners and inspectors are destructive to the chances of examinees. I flew twice with one, who, in my opinion and that of several others, is technically fair, with no tricks, but who likes to keep you twitching, on edge. Another was so notorious around here for asking silly trick questions that some highly experienced instructors (including one who has been an Air Force examiner) refused to send candidates to him and, God help us, he has been taken on by the FAA as an inspector.

He is not the first inspector to be known for that, and it must cast severe doubt on the integrity of the FAA's intentions. If the FAA is truly interested in promoting aviation, then it must emphasize fairness in flight tests. A good start might be to find out who are the unfair inspectors and examiners and take them off the job entirely.

Until that happens, Drake's article and similar ones serve merely to emphasize the complacency of an organization that does not have to be responsive to those over whose lives it has so much power.

Name withheld

Thank you for your letter. We deeply regret that your tenure as a certificated flight instructor was not more rewarding. Aviation can ill afford to lose dedicated instructors. Checkrides are in fact tests, and we all react differently to being tested. However, we feel we must take exception to your comments regarding the FAA's testing philosophy. All of us have had checkrides with "good" evaluators and "not so good" evaluators. In many cases, the difference between the good and not so good evaluators was how we reacted to them as individuals. If we liked them, they were good, if we felt uncomfortable with them the moment we met them, we knew the test was going to be bad. And yes, there are a few bad evaluators. Some are either trying to prove their own superiority, or they are simply repeating the bad habits they learned during their own early training and testing. Neither the FAA nor industry is immune from these "not so good" evaluators.

Your comment regarding the fairness of FAA testing perhaps stems from a lack of information about how performance is to be measured during a practical test. FAA designed its current pilot Practical Test Standards (PTS) to be fair and to ensure the consistency of flight testing across the

FAA AVIATION NEWS welcomes comments from its readers. We may edit letters for style and/or length. We will select one representative letter from those on the same topic for publications, and because of our bimonthly publishing schedule, responses may not appear for several issues. We will send personal replies only upon request. We will not print anonymous letters, but we will withhold names upon request. Address: Editor, FAA AVIATION NEWS, AFS–810, Washington, DC 20591.

country. This was not always the case. The old Flight Test Guides only outlined areas to be tested. The Guides left it up to the evaluators how to do the tests. Some of the "not so good" evaluators used the broad guidelines to ask their trivial questions and to use their various "tricks" to harass the person being tested. Some probably felt these "tricks" eliminated the "less than perfect" pilots out of aviation for the good of all. They may have felt the high-stress testing methods used by the military at the time applied to civilian applicants. Those days are gone. Today, the PTS set the same testing standards for a given test for everyone. Applicants preparing for a test today knows exactly what areas are going to be tested and the standards that are going to be used to evaluate their performance during the test. The applicant's performance either meets the standards or not. If the applicant feels he or she did not receive an accurate evaluation from a designated pilot examiner, the applicant can ask the FAA for a retest with an FAA inspector. As Mr. Drake pointed out in his article, every applicant planning on taking a flight test should review the appropriate PTS to ensure they understand and can meet all of the standards listed.

In addition to redrafting its testing procedures, the FAA trained its inspectors and designated pilot examiners how to use the new testing standards as the new PTS were released. Today, that training is an integral part of FAA inspector training at the FAA Academy in Oklahoma City, OK. All Aviation Safety Inspectors (Operations) and designated pilot examiners are taught how to give practical tests using the PTS.

So, to respond to your statement that the FAA is complacent in its concern for those it tests, the facts prove otherwise. The FAA redesigned its testing procedures to ensure that all applicants receive an objective and realistic practical test which measures only their knowledge and skills necessary to operate an aircraft safely and in accordance with national standards—not those of the evaluator.

We urge you to obtain a copy of the Flight Instructor Practical Test Standards appropriate to the instructor certificates you held and re-evaluate your decision to cease instructing. We need you.

• Legal Approach Plates

Would the FAR be violated if a pilot utilized an instrument approach plate that was still current (latest amendment) but which was contained in an instrument approach bound volume that according to the dates published on the front was no longer effective.

Cyril Toker
Ponte Vedra Beach, FL

Yes, because the pilot may have an out of date instrument approach plate (IAP). IAP amendments reflect only such changes as altitudes, courses to be flown, and final approach minimums on instrument approach plates. Other chart changes can be made without an amendment. Radio frequencies and airport sketches are two items that can be changed without an amendment being issued. You could have a situation where the amendment number is still current, but critical radio frequency information or airport diagram information on the IAP may not be current. Because airport information can change, it is important for pilots to always utilize current IAP's, consult change notices, and check NOTAM's, especially FDC, for the current status of any airport they plan on using.

• Magazine Critique

After seeing several issues, please accept these comments. Use your space to present FAA-related communications to us such as four inspectors saying what they look for most on checkrides, etc. If you try to compete in writing style with regular magazines you not only suffer by comparison with the pros, but also deny us FAA comms. You have eliminated (apparently) the "Instrument Corner." This was, in my opinion, the best ongoing feature you had. It is exactly what I refer to as "FAA comm" to us. No other pub can do this...this is your exclusive property. . . if over half the issue were the "Flight Forum" it would be closer to ideal.

Re the May/June 1992 article on "How to Pass Your Next FAA Flight Test." (By the way, this is the type of article FAA Aviation News *should contain.) Perhaps Mr. Drake should now include in his very pertinent memory aid the fact that the FAA now ramp checks for having the proper charts up-to-date on board. Could his checklist aid then be advanced from ARROW to CARROW?*

C—charts/communications data
A—airworthiness certificate
R—registration (aircraft)
R—radio station license (if needed)
O—operating limits
W—weight and balance

Howie Keefe
Venice, CA

The printing of the "Instrument Corner" depends on the availability of a letter from one of our readers. In the May/June issue that you referred to the "Flight Forum" was expanded to two pages and the "Instrument Corner" required an additional page to answer the question. Admittedly the magazine cannot dedicate three pages every issue to the "Forum" but it will be expanded as often as space allows. Thank you for your comments. It is alway interesting to know what our readers think of us.

• Requesting SVFR

If a private pilot was sure he could maintain clear of clouds and a mile visibility, would it be plausible for him or her to request a special VFR clearance to spiral up in a control zone to get through a scattered or broken layer of clouds to VFR conditions on top to continue the flight to an airport where a descent could be made under VFR?

According to regulations it should be legal, but I am wondering what the odds are that an air traffic controller would permit it?

Matt Stans
Bloomington, MN

Yes, it is legal to request such a clearance, and the odds are good ATC will approve the request if Special VFR is permitted at that airport. However, the question that must be asked is, though it may be legal, can such a clearance be executed safely. Since we are assuming that the pilot is not instrument rated, we question the safety of such a request by a non-instrument rated pilot because we do not know the answers to some of the old "what if" questions that a pilot must ask before considering such an operation. Will I be able to maintain the basic VFR minimums required in FAR § 91.155 upon exiting the control zone? What if conditions change? What if I get trapped on top? What if the airport of intended landing goes IFR? What if I have an emergency such as an engine failure? What if I lose communications? What if I lose my navigation capability? An air traffic controller will provide available weather information, but it is the pilot-in-command's responsibility to integrate this information with the answers obtained from the above questions before commencing a flight.

AIR SHOWS!

What do Abilene, Brooklyn, Clemson, Davenport, Erie, Ft. Wayne, Galveston, Honolulu, Indianapolis, Jacksonville, Kalamazoo, Lakeland, Marquette, Norfolk, Oshkosh, Paris, Rapid City, San Diego, Tampico, Valdosta, and Yuma have in common? They and some 420 other cities in North America and Europe are hosting air shows this year. Nearly 25 million people will attend these air shows between mid-March and early December this season. That's close to twice the number who will attend NFL football games or auto races. Only baseball, which attracted 55.8 million spectators last year, can expect higher attendance than air shows.

Projected 1993 attendance is based on an annual 2.25% growth rate over the last four years. In 1992 nearly 24.4 million attended festivals that featured aerial events. Of these 346 were "typical" air shows, drawing an average 54,473 fans over a two-day weekend; some 90 were small, largely undocumented events that drew fewer than 8,000; eight were "mega" events that collectively attracted four million or more; and last, but not least, is EAA's annual convention in Oshkosh, WI, which drew 800,000.

Of all North American air shows scheduled for this year, 81% will be held in the U.S. while 19% will be in Canada. Three events will be in Mexico. Civilian air shows account for 74%, and 26% are military. In the U.S. California leads with 37 shows; next is Florida with 17. Texas, Arizona, and Washington each have 16, and all states except Delaware will have at least one.

In a survey conducted by the International Council of Air Shows (ICAS), the largest trade and professional association representing the air show industry, it seems that the majority of spectators are most interested in seeing military aircraft and demonstration teams like the Canadian Snowbirds, the U.S. Navy Blue Angels, and the U.S.A.F. Thunderbirds.

Air shows are highly visible community events with excellent safety records and traditionally serve as charitable fund raisers. In 1992 alone, air shows contribution an average of $37,242 each to local charities—a combined contribution of $15 million.

If you are interested in the complete schedule of air shows remaining in the season, please contact ICAS at 1931 Horton Road, Suite 7, Jackson, MI 49203; (517) 782-2424—ask for Linda Singer.

Flight Standards Bulletin Board System

Since December 1991 the Flight Standards District Office (FSDO) in Orlando, FL has operated a computer bulletin board system (BBS) which answered more than 10,000 user requests for a variety of FAA-supported information. The BBS is open for access around the clock, seven days a week, and it is a straight-forward, user friendly system for even the novice computer user. There are no complicated log-on procedures, and once the initial online registration questionnaire is completed, callers obtain "public user" access.

The BBS provides three primary users functions: Electronic Mail messaging, Online Read Files, and a File Transfer Database. An easy-to-follow menu guides the user from one function to the next.

Electronic Mail Messaging allows message exchange among users of the BBS and any registered FAA representative. The "Ask the FAA" message base assures standardization of information among all users of the BBS. The Electronic Mail Messaging primarily supports North Florida as well as certain Flight Standards offices in FAA's Southern Region in Atlanta, GA.

The Read File consists of a variety of North Florida FSDO listings such as Accident Prevention Program safety seminars, air shows, designated examiners, Orlando FSDO personnel, and frequently requested FAA phone numbers at Oklahoma City, OK.

The File Database provides users with a terrific selection of the latest master minimum equipment lists, advisory circulars, Accident Prevention Program "P" pamphlets, and, of course, the latest *FAA Aviation News* [without pictures or graphics, though; to get the full effect, you need to subscribe—Editor's shameless commercial].

The BSS currently serves over 1,000 computer users nationwide, and Orlando APPM Obie Young and Systems Operator Bill Hoenstine want more. Now that the system has a nationwide toll-free number, they should get their wish.

So, don't miss out! Join the growing number of computer-literate airmen who have discovered the benefits of membership in the North Florida FSDO Computer Bulletin Board System. Connect with the BBS via 1-800-645-FSDO (3736).

AVNEWS/BRIEFS

Charles Taylor "Master Mechanic" Award

Hot on the heels of the very successful Aviation Maintenance Technician Awards begun in October 1992 (see September/October 1992 *FAA Aviation News),* FAA's Aircraft Maintenance Division has enacted the Charles Taylor "Master Mechanic" Award Program to recognize the lifetime accomplishments of senior mechanics. The "Master Mechanic" Award is named after Mr. Charles Taylor, the very first aviation mechanic—he worked for the Wright Brothers and is credited with designing and buidling the first successful aircraft engine.

The "Master Mechanic" Award will recognize those individuals who have taken the aviation maintenance industry from radial engines to the space age and have made it the bench mark for safety that other transportation systems strive to imitate. The award will be signed by the FAA Administrator, and FAA Headquaters will maintain a Roll of Honor of all awardees.

To qualify for the award the individual must have at least 50 years in the aviation maintenance profession. At least 40 of those years must have been as a certificated mechanic or repairman. The remaining 10 years can be based on military service as a mechanic or in the aviation maintenance industry before being certificated. Enforcement actions such as civil penalties or suspension or administrative actions such as letters of correction will not be considered sufficient grounds for denying an individual the award. However, if an individual has had his or her certificate revoked at any time, that individual will not be considered eligible.

Qualified individuals may submit their own names, or they can be nominated by others. The request must be in writing to the local FSDO to the attention of the Airworthiness Supervisor. The letter should include a summary of the individual's background and show at least 50 years of aviation maintenance experience. The letter should also include the names of at least three certificated mechanics or repairmen who recommend the individual for the award. At least once a year the FSDO will assemble a Master Mechanic Award Selection Team made up of an FAA airworthiness supervisor and no fewer than two members of the aviation maintenance community. The team will select the winners from the nominations received, and there is no limit to the number of annual awardees.

The Master Mechanic awardee will receive the award from the local FSDO manager and before his or her peers in the aviation maintenance industry. In that way the Master Mechanic is the perfect role model of professionalism for newcomers to the aviation maintenance community.

For additional information on the program or on the upcoming advisory circular describing it, please contact the Awards Program Manager, Lee Norvell at (202) 257–8616. Her address is FAA, AFS–361, 800 Independence Avenue, SW, Washington, DC 20591.

AIRCRAFT SAFETY REVIEW

AOPA's Air Safety Foundation has just started a new service that will be of benefit to current aircraft owners and prospective buyers. This spring they issued the first of their Safety Reviews, the inaugural one on the Cessna P210.

Foundation safety analysts studied accident and incident reports on the Cessna P210 for a seven-year period and compiled the results in text and graphic presentations. The Safety Review consists of four parts:

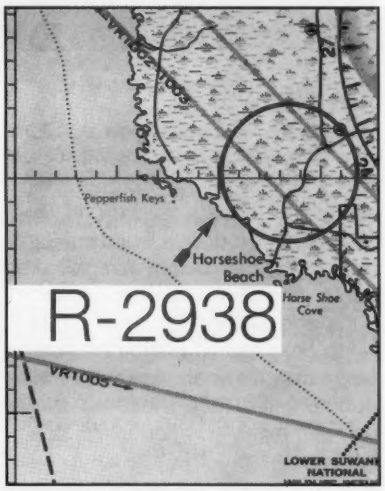
Part 1 is a summary of statistical accident data and a comparison to other aircraft of similar configuration (e.g., the P210 is compared to other single engine, turbocharged, retractable gear aircraft).

Part 2 is a compilation of serious accident briefs and a summary of minor accidents.

Part 3 consists of a training outline for instructors and pilots to use in incorporating risk management techniques into transition and recurrent training; emphasis is on areas that have been shown to have a high risk factor.

Part 4 contains articles reprinted from AOPA Pilot magazine on the specific aircraft.

The Cessna P210 Safety Review is available for $19.95 (plus shipping and handling) from the AOPA Air Safety Foundation, 421 Aviation Way, Frederick, MD 21701; (800) 638–3101. The Foundation is currently compiling data for the next Safety Review on all models of the Beech Bonanza. That review should be available later this year.



CAUTION: Tethered Balloon!

If you are flying in the vicinity of Horseshoe Beach, FL—on the Gulf Coast west of Gainesville—you need to avoid a restricted area that became effective this past April 1 (no fooling!). R–2038 contains a tethered Aerostat balloon that reaches an altitude of 15,000' MSL. The Aerostat is lighted with white strobe lights, but the tether is NOT lighted or marked.

R–2938 encompasses airspace from the surface to "unlimited," within a three nautical mile radius of a point centered at 29°29'59" north latitude and 83°16'16" west longitude. The restricted area is active continuously 24 hours a day and will appear on the September 16, 1993 edition of the Jacksonville Section Aeronautical Chart. Until you receive your copy, consult the graphic of the restricted area published in NOTAM's.

Question: *In reading the new FAR, I read in Section 91.117 that Class B (former TCA's) are going to have a 200 KIAS speed restriction below 2,500 feet AGL within 4-miles of the airport. Is this correct?*

Answer: Our eagle-eyed reader is correct in that is the language in FAR § 91.117(b) effective September 16, 1993. However, this was an administrative error and the Class B inclusion will be deleted prior to the effective date.

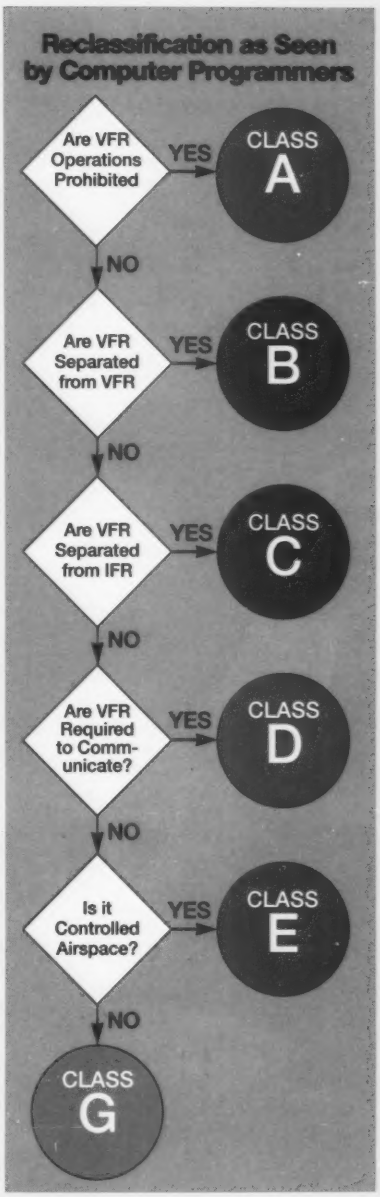
Question: *The airport I fly out of has a Class D radius with two Class E arrival extensions. Why are there more than one class of airspace for a single airport?*

Answer: When the airspace reclassification was proposed, the entire control zone at towered airports were going to become Class D. However, based on public comments and the FAA's effort to minimize the number of rule changes, it was decided that if all extensions were two miles or less, the extensions would remain part of the basic surface area and require communications with ATC. However, if any extension was greater than two miles, all extensions would be Class E. This allows the instrument approaches to be contained within controlled airspace without imposing a communications requirement on pilots operating VFR that was not previously required. Remember, if there is an arrival extension, it means that an aircraft executing an instrument approach to that airport is authorized to descend below 1,000 feet AGL. If you are transiting the airspace low level, it would be a good operating practice to contact the tower and advise them of your presence and intentions.

Question: *I fly out of a satellite airport within the ATA surface area and communications with the tower are not required when taking off or landing. Does this change when the airspace becomes Class D.*

Answer: Yes. The current provision for this exception has been removed from FAR § 91.127(c) effective September 16, 1993. FAR § 91.129, Operations in Class D airspace, establishes a communications requirement for all aircraft operating within the airspace. The FAA made a concerted effort to exclude satellite airports from surface areas to the extent practicable. However, for those satellites that weren't excluded, the legal clause "unless otherwise authorized," has been left in. This allows local FBO's and operators of flying schools to coordinate with the air traffic control manager and develop procedures that would exempt local pilots from communicating with the control tower but not relieve transient pilots of the requirement.

Editor's note: *In the March issue, we replied to a question to the effect that FAR § 91.157(a)(1) had been amended to allow ATC to authorize SVFR operations up to but not including 10,000 feet MSL. This authorization in still in coordination and will be published as a notice of proposed rulemaking soon. We regret any inconvenience this may have caused.*



U.S. Department
of Transportation

**Federal Aviation
Administration**

800 Independence Ave., S.W.
Washington, D.C. 20591

Official Business
Penalty for Private Use $300

FAN SERIA300SCISSDUE011R 1
SERIALS PROCESSING
UNIV MICROFILMS INTL
300 N ZEEB RD
ANN ARBOR MI 48106

BULK RATE
POSTAGE & FEES PAID
GPO
PERMIT NO. G-26

DO NOT DELAY—CRITICAL TO FLIGHT SAFETY!